2007 Surface Water and Groundwater Monitoring Report

New World Mining District Response and Restoration Project

United States Department of Agriculture
Forest Service
Gallatin National Forest

2007 SURFACE WATER AND GROUNDWATER MONITORING REPORT NEW WORLD MINING DISTRICT RESPONSE AND RESTORATION PROJECT

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1.0 INTRODUCTION

Tetra Tech (formerly known as Maxim Technologies) prepared this Surface Water and Groundwater Monitoring Report for the United States Department of Agriculture (USDA) Forest Service, Gallatin National Forest. This document presents surface water and groundwater data collected during the 2007 calendar year. Surface water and groundwater monitoring activities are being conducted in conjunction with on-going response and restoration work that is being completed in the New World Mining District (District).

Monitoring of surface water and groundwater quality falls within the purpose and objectives of the overall project, which are described in detail in the Overall Project Work Plan (Maxim, 1999a). To avoid redundancy, only generalized descriptions of the project are provided in this report. The reader is encouraged to review the Overall Project Work Plan and the 2007/2008 Work Plan (Tetra Tech, 2007a) to gain a comprehensive understanding of the overall project.

Database summaries and laboratory analytical reports are included in appendices in this report. The project database and other project documents referenced in this report are available on the project website at the following address:

http:/www.fs.fed.us/r1/gallatin

1.1 PROJECT BACKGROUND

The District, which includes a mixture of National Forest System (NFS) and private lands, is a historic metals-mining district located in the vicinity of Cooke City, Montana. This historic mining district is centered about four miles northeast of the northeast gate to Yellowstone National Park, and contains hard rock mining wastes and acid discharges that impact human health and the environment. Human health and environmental issues are related to elevated levels of heavy metals present in mine waste dumps, open pits, acidic water discharging from mine openings, surface water, stream sediments, and groundwater.

On August 12, 1996, the United States signed a Settlement Agreement with Crown Butte Mines, Inc. (CBMI) to purchase CBMI's interest in their District holdings. The resulting transfer of property to the United States effectively ended CBMI's proposed mine development plans and provided $22.5 million to cleanup historic mining impacts on specific properties in the District. In June 1998, a Consent Decree was signed by all interested parties and CBMI, and approved by the U.S. District Court, that finalized the terms of the Settlement Agreement and made available the funds that are being used for mine cleanup.

The USDA Forest Service, as the lead agency responsible for implementing the cleanup of the District, has assembled an organization and guiding objectives to proceed with response actions and restoration of historic mining impacts in the District. Under their Superfund authority, the USDA Forest Service is conducting response and restoration activities by following guidance provided by the United States Environmental Protection Agency (U.S. EPA) for non-time-critical removal actions (U.S. EPA, 1993).

1.2 PURPOSE

The primary purpose of surface water and groundwater monitoring conducted during 2007 was to continue to collect data to document changes in water quality that result from response and restoration actions. Surface water quality monitoring is also being conducted in the District to comply with the requirements of the rule adopting temporary water quality standards for segments of Daisy Creek, the Stillwater River, and Fisher Creek (Maxim, 2003a) in accordance with the Montana Water Quality Act (§ 75-5-201 et seq.).

In addition to long-term surface water monitoring conducted in 2007 at specific stations in the Daisy Creek, Fisher Creek, Miller Creek, and Soda Butte Creek drainages, surface water monitoring was performed at other select sites in support of more detailed studies of water quality. These select sites include the Glengarry Adit, Gold Dust Adit, Como Basin areas, the reclaimed McLaren Pit area, and the New World Waste Repository area.

Long-term groundwater monitoring was also conducted in 2007 along with additional groundwater monitoring performed in the McLaren Pit and New World Waste Repository areas in support of more detailed studies of groundwater characteristics.

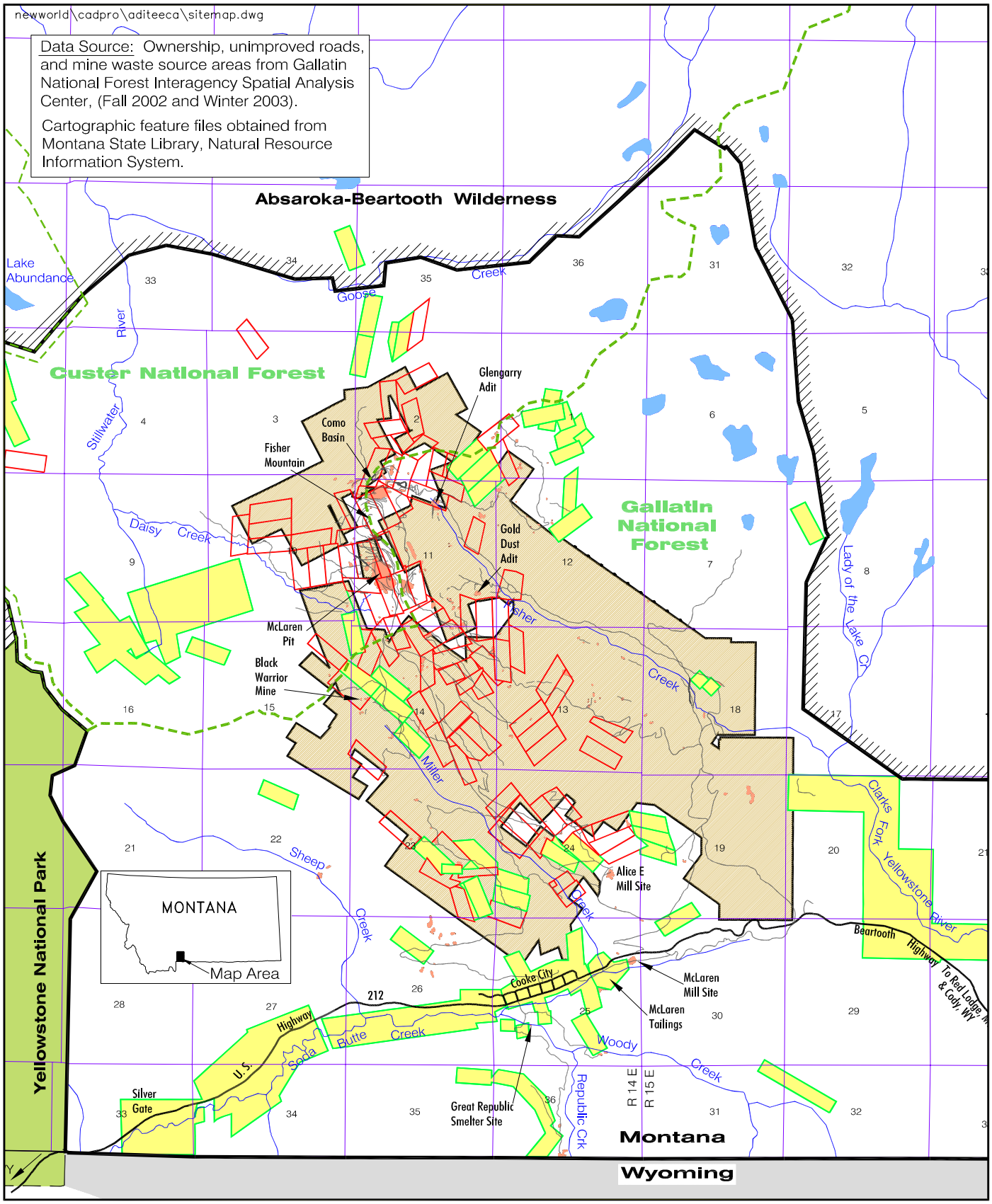
1.3 SITE DESCRIPTION

The New World Mining District is located in the southern end of Park County in south-central Montana. The District is bounded on the south by the Montana-Wyoming state line, on the west by Yellowstone National Park, and on the north and east by the Absaroka-Beartooth Wilderness Area boundary (**Figure 1**). The communities of Cooke City and Silver Gate, Montana, are the only population centers near the District. The neighboring communities of Mammoth, Wyoming, and Gardiner, Montana, are located about 85 kilometers (50 miles) to the west.

The District is characteristic of sub-alpine regions of the northern Rocky Mountains with elevations ranging from approximately 2,400 meters (7,900 feet) to over 3,100 meters (10,200 feet). Accumulated snow pack in the higher elevations ranges in depth from three meters (10 feet) to over six meters (20 feet) where drifting occurs. The ground is generally snow covered from late October through mid May at the lower elevations and from early October through late June at the higher elevations. Perennial and semi-perennial snowfields occupy the north facing slopes of the highest mountain peaks.

Area streams are high energy, first and second order tributaries of the Yellowstone River system. These streams occupy glacially carved valleys and are fed largely by melting snow pack. Peak streamflow is characteristically reached by mid June or early July and may be several orders of magnitude higher than base flow conditions, which typically occur from late August through early spring. Three drainage basins have been identified as being impacted by historic mining activities: 1) Fisher Creek and the Clarks Fork of the Yellowstone River, 2) Daisy Creek and the Stillwater River, and 3) Miller Creek and Soda Butte Creek.

The District covers an area of about 10,360 hectares (25,600 acres). Historic mining disturbances affect about 20 hectares (50 acres) located on District Property, which includes all lands or interest in lands transferred to the United States by CBMI. The main mining disturbances on District Property include the McLaren Pit, the Como Basin, and numerous small



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District Property Boundary
District Boundary
Unimproved Road
National Forest Boundary
Wilderness Boundary
Mine Waste Source Area
District Property (Patented Claims)
District Property (Unpatented Claims)
Private Property

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Project Vicinity Map
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 1

waste dumps and adit discharges. Many of these sites have been reclaimed since the project was initiated in 1999. Mining disturbances on non-District Property include the McLaren Tailings and Mill Site, which cover an additional 6.9 hectares (17 acres), the Great Republic Smelter (0.2 hectares; 0.5 acres), and waste associated with numerous scattered mines and prospects. A portion of the McLaren Mill Site (1 hectare; 2.5 acres) and the Great Republic Smelter were reclaimed in 2005 by the USDA Forest Service and the EPA in conjunction with reclamation activities on District properties.

2.0 METHODS

Surface water and groundwater monitoring activities were conducted in accordance with the 2007/2008 Work Plan (Tetra Tech, 2007a), the Site-Wide Sampling and Analysis Plan (Site-Wide SAP; Maxim, 1999b), and the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999c). More detailed descriptions of sampling methods can be found in these documents. A summary of methods used to complete monitoring activities during 2007 is provided in this section.

2.1 SURFACE WATER MONITORING

Surface water monitoring was conducted at 12 long-term stations and 18 supplemental stations during 2007. Ten adit stations were also monitored during 2007. Surface water sampling stations are shown on **Figure 2** and listed in **Table 1**. Adit locations are shown on **Figure 3** and listed in **Table 2**.

Sampling and analytical methods are described in the Tetra Tech's 2007/2008 Work Plan and the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999c). Samples were analyzed for total recoverable metals, dissolved metals (except stations DC-2, SW-3, and the four Soda Butte Creek stations), common ions, and other parameters including alkalinity, acidity, total suspended solids (TSS), and total dissolved solids (TDS).

2.1.1 Long-Term Monitoring

The 12 long-term surface water monitoring stations have been consistently monitored since 1999, with many of the sites monitored more frequently during the 1990's. Long-term surface water monitoring was conducted in April, June, and September 2007. Monitoring occurred at or near winter low flow conditions (April), at or near high flow conditions (June), and during fall low flow conditions (September). All surface water samples were submitted to Northern Analytical Laboratories, Inc., (NAL) in Billings, Montana, for analysis of parameters listed in the 2007/2008 Work Plan (Tetra Tech, 2007). Discharge measurements, field parameters, and field observations were recorded at all surface water monitoring stations during each sampling event following established standard operating procedures.

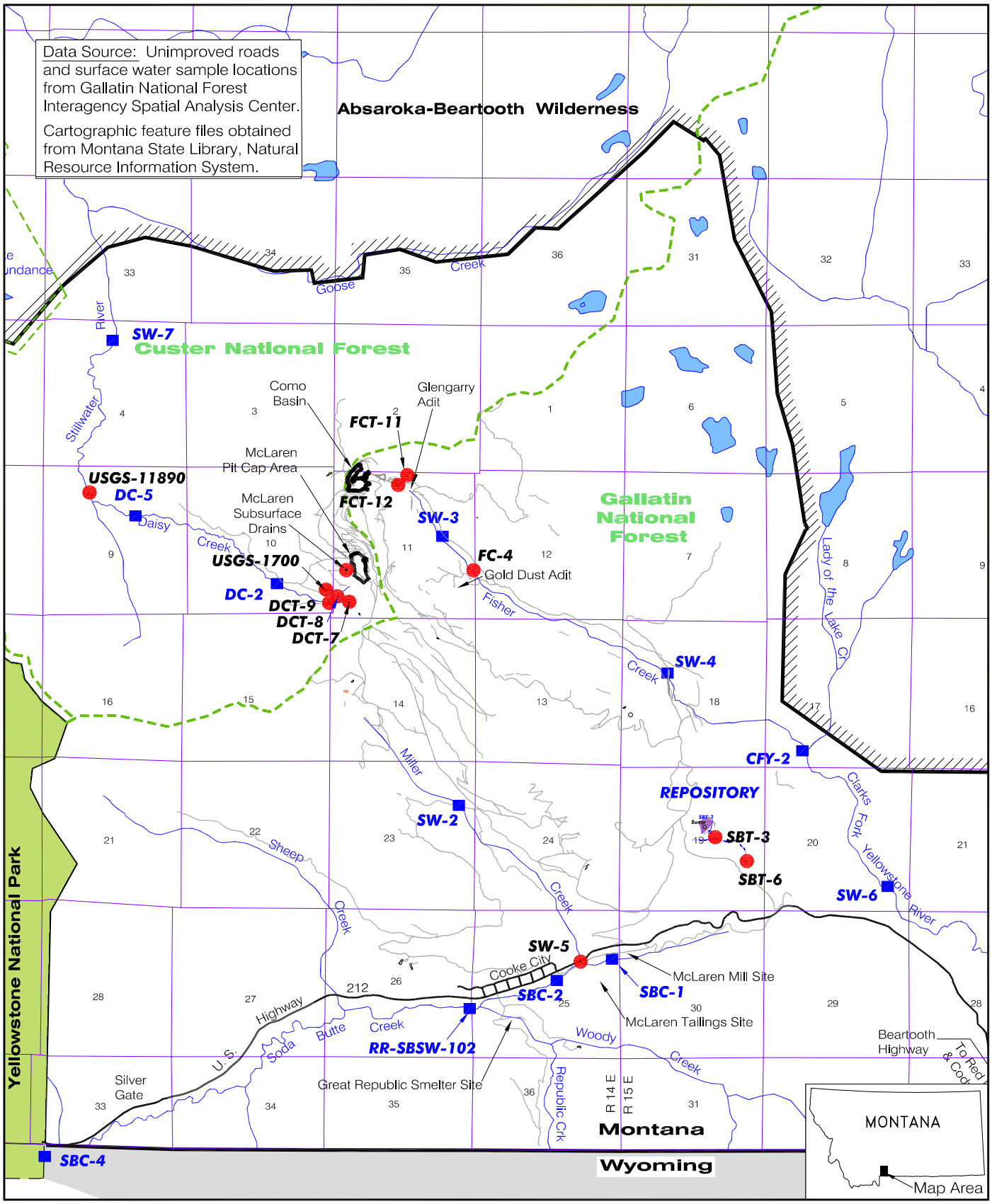
2.1.2 Supplemental Water Quality Monitoring

Supplemental water quality monitoring was conducted at stations located in tributaries to Daisy Creek, on the Stillwater River, in Fisher Creek, Soda Butte Creek, and in a tributary to Soda Butte Creek. **Table 1** identifies these supplemental stations and the frequency sampled. Field parameters were collected at the stations listed in **Table 1** during each monitoring event and included measuring streamflow, pH, specific conductance (SC), and temperature. Samples were collected for laboratory analysis. Samples were shipped to NAL for analysis of parameters listed in the 2007/2008 Work Plan (Tetra Tech, 2007). The results of monitoring McLaren Mill site runoff stations (SBMS-US, SBMS-RO, SBMS, and SBMS-DS) are presented in a Technical Memorandum, McLaren Mill Site Water Quality Monitoring Results (Tetra Tech 2008).

TABLE 1
2007 SURFACE WATER SAMPLING STATIONS
New World Mining District Response and Restoration Project

Site Name	Location	April	May	June/July	Sept
Daisy Creek Drainage					
DCT-7 *	Daisy Cr. tributary south of McLaren Pit	--	--	X	X
DCT-8 *	Daisy Cr. tributary south of McLaren Pit	--	--	X	X
DCT-9 *	Daisy Cr. tributary south of McLaren Pit	--	--	X	X
USGS-1700 *	Daisy Cr. tributary south of McLaren Pit	--	--	X	X
Cover Drains *	McLaren Pit drains beneath cover (DCSW-101, -102, -103)	--	--	X	X
DC-2	Daisy Creek below confluence of McLaren tributaries	X	--	X	X
DC-5	Daisy Creek above confluence with Stillwater River	X	--	X	X
USGS-11890 *	Stillwater River below the mouth of Daisy Creek	--	--	--	X
SW-7	Stillwater River at Stillwater Trail Crossing	X	--	X	X
Fisher Creek Drainage					
FCT-12 *	Tributary south of former Glengarry Adit	--	--	X	X
FCT-11 *	Tributary below Como Basin	--	--	X	X
SW-3	Fisher Creek below former Glengarry Adit	X	--	X	X
FC-4 *	Fisher Creek just above the Gold Dust Adit tributary (USGS synoptic station 1,704 meters)	--	--	--	X
SW-4	Fisher Creek at Lulu Pass Road Crossing	X	--	X	X
CFY-2	Fisher Creek above Clarks Fork confluence	X	--	X	X
Clarks Fork River Drainage					
SW-6	Clarks Fork Yellowstone River at Saw Mill Road	X	--	X	X
Miller Creek Drainage					
SW-2	Miller Creek below Miller Mountain Road Crossing	X	--	X	X
SW-5 *	Miller Creek near mouth	X	--	X	X
Soda Butte Creek Drainage					
SBT-3 *	Soda Butte Creek Tributary below Repository Site	X	X	--	X
SBT-6 *	Soda Butte Creek Tributary below Repository Site	X	X	--	X
SBMS *	McLaren Mill site runoff Stations (SBMS-US, SBMS-RO, SBMS, SBMS-DS)	--	--	X	X
SBC-1	Soda Butte Creek above confluence with Miller Creek	X	--	X	X
SBC-2	Soda Butte Creek below McLaren Tailings	X	--	X	X
RR-SBSW-102	Soda Butte Creek below Woody Creek	X	--	X	X
SBC-4	Soda Butte Creek at Park Boundary	X	--	X	X

Note: * Indicates supplemental surface water monitoring station


Data Source: Unimproved roads and surface water sample locations from Gallatin National Forest Interagency Spatial Analysis Center.
Cartographic feature files obtained from Montana State Library, Natural Resource Information System.
Absaroka-Beartooth Wilderness
Custer National Forest
Gallatin National Forest
Yellowstone National Park
Montana
Wyoming
SW-7
Como Basin
Glengarry Adit
FCT-11
McLaren Pit Cap Area
FCT-12
USGS-11890
DC-5
McLaren Subsurface Drains
USGS-1700
DC-2
DCT-9
DCT-8
DCT-7
SW-3
FC-4
Gold Dust Adit
SW-4
CFY-2
REPOSITORY
SBT-3
SBT-6
SW-6
SW-2
SW-5
Cooke City
SBC-2
SBC-1
McLaren Mill Site
McLaren Tailings Site
RR-SBSW-102
Great Republic Smelter Site
Silver Gate
SBC-4
Beartooth Highway
To Red & Cod
MONTANA
Map Area
District Boundary
Unimproved Road
National Forest Boundary
Wilderness Boundary
Long-Term Monitoring Station
Supplemental Monitoring Station
N
0 Meters 1500
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McLaren Subsurface Drains include DCSW-101, DCSW-102, and DCSW-103
2007 Surface Water Monitoring Stations
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 2
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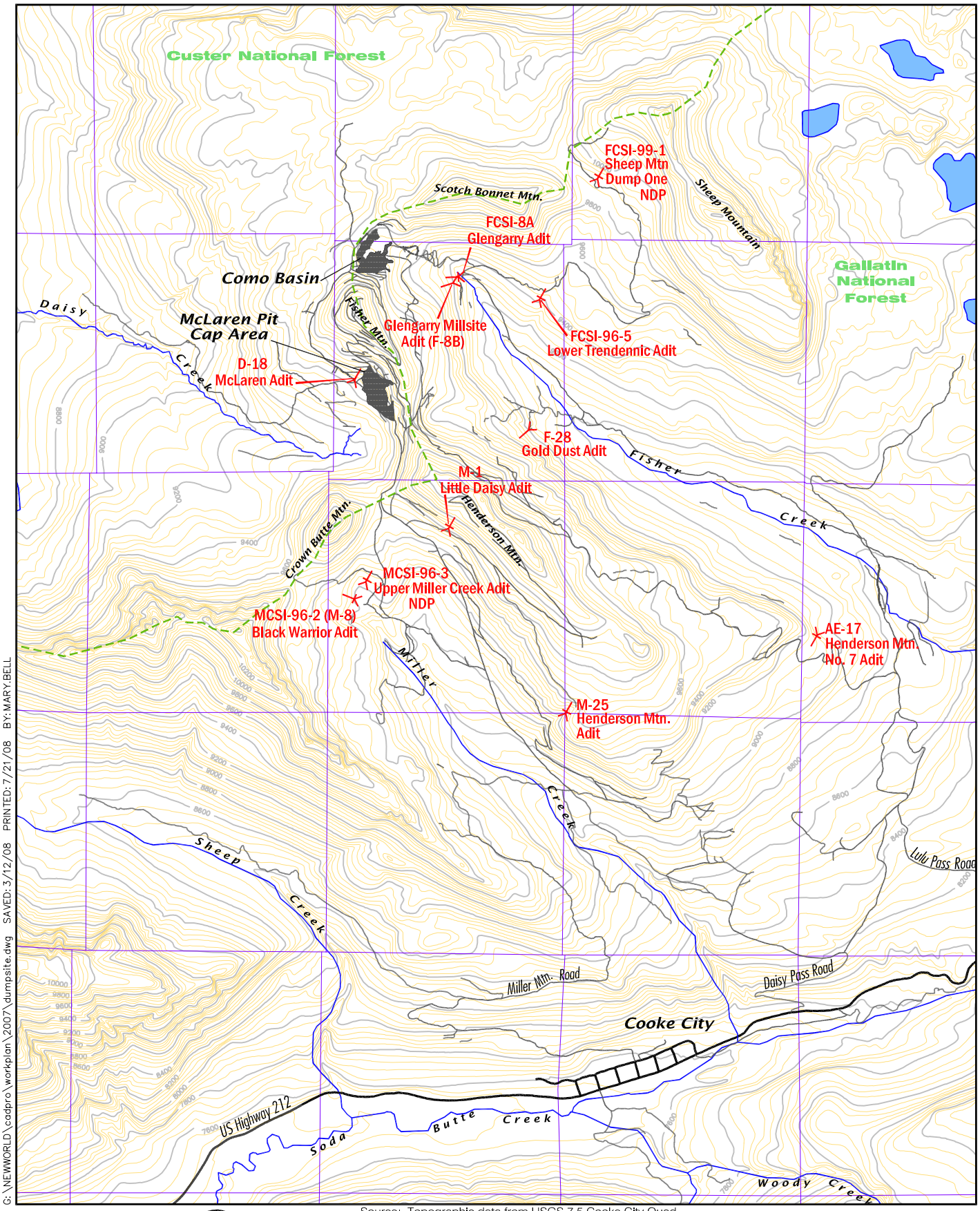

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Source: Topographic data from USGS 7.5 Cooke City Quad
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Forest Boundary

Roads

Adit Discharge Sample Site

NDP Non District Property

2007 Adit Discharge Monitoring Sites
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 3

TABLE 2
2007 ADIT DISCHARGE SAMPLE SITES
New World Mining District Response and Restoration Project

Adit Station No.	Site Name[1]	Drainage	Last Sampled	Flow (gpm) [2]	Exceedance[3]
F-8B	Glengarry Mill Site Adit	Fisher	7/29/2004	5.0	Cu, Fe, Mn
F-28	Gold Dust Adit	Fisher	9/26/2006	3.6	Fe, Mn
FCSI-96-5	Lower Tredennic Dump 1	Fisher	9/22/2004	1.4	Fe, Mn
FCSI-99-1	Sheep Mountain #1 (NDP)	Fisher	7/16/2003	2.0	Fe, Pb
AE-17	Henderson Mountain Dump 7	Fisher	7/15/2003	5.0[4]	Cu, Fe, Mn
D-18	McLaren Adit	Daisy	9/23/2004	4.7	Cu, Fe, Mn
M-8	Black Warrior Adit	Miller	9/23/2004	8.1[4]	Cd
MCSI-96-3	Upper Miller Creek Dump (NDP)	Miller	7/16/2003	2.0	Cd
M-1	Little Daisy Adit	Miller	9/23/2004	2.9	Cd, Fe, Mn
M-25	Henderson Mt Adit	Miller	7/10/2003	2.0	Cu, Pb

Notes:
1. Adit sites were sampled twice in 2007 during August and September; samples were analyzed for total and dissolved metals; NDP = non-District Property
2. gpm = gallons per minute
3. Exceedance of water quality standard or guideline in most recent sampling event; Cd = cadmium; Cu = copper; Fe = iron; Mn = manganese; Pb = lead
4. Flow measured or estimated in streamflow below adit

2.1.3 Adit Water Quality Monitoring

Ten adit discharges were monitored during August and September 2007 to determine base flow conditions (**Table 2**). The Glengarry adit discharge was also monitored as part of the surface water monitoring program. Locations of the adits monitored are shown in **Figure 3**. Monitoring involved measuring field parameters including flow, pH, temperature, and SC. Samples for laboratory analysis were collected and shipped to NAL for the surface water parameters listed in the 2007/2008 Work Plan (Tetra Tech, 2007).

2.2 GROUNDWATER MONITORING

Groundwater monitoring was conducted at 43 well locations in 2007. Wells monitored are listed in **Tables 3** and **4** and are shown on **Figures 4** and **5**. Samples were collected at select wells for laboratory analysis of dissolved metals, common ions, and other parameters including alkalinity, acidity, and total dissolved solids.

For the collection of field parameters, depth to groundwater was first measured in monitoring wells using a decontaminated electric water level indicator. The well was then purged to allow formation water to enter the well. If the water level in the well was less than about 65 feet (or 20 meters) then field parameters were measured in the well using a down-hole multi-probe (YSI 556 with a 20 meter cable). Deeper water levels would necessitate the use of a flow-through cell while purging the well with a submersible pump or bringing water samples to the surface using a bailer. Field parameters included temperature, pH, SC, dissolved oxygen, and oxidation/reduction potential (ORP).

TABLE 3
McLAREN PIT AREA MONITORING WELLS
New World Mining District Response and Restoration Project

Well No.	Year Installed	Completion Formation	July 2007	September 2007
DCGW-100	2003	Meagher Limestone	X	F
DCGW-101S	2001	Colluvium	X	F
DCGW-101D	2001	Lulu Pass Rhyodacite Porphyry	X	F
DCGW-111S	2003	Colluvium	X	F
DCGW-111D	2003	Bedrock	X	F
Tracer-2	1997	Fisher Mtn. Intrusive	X	F
MW-2	1989	Wolsey Shale	X	F
MW-3	1989	Wolsey Shale	X	--
DCGW-103S	2001	Colluvium	F	--
DCGW-103D	2001	Wolsey Shale	F	--
DCGW-104 [W]	2001	Waste Rock	X	F
DCGW-105 [W]	2001	Waste Rock	X	F
DCGW-106	2002	Colluvium	F	--
DCGW-107	2002	Colluvium	X	--
DCGW-108	2002	Colluvium	X	--
DCGW-109	2002	Colluvium	F	--
DCGW-110	2002	Colluvium	F	--
DCGW-112	2002	Colluvium	F	--
DCGW-131	2002	Colluvium	F	F
DCGW-132	2002	Colluvium	X	F
DCGW-133	2002	Colluvium	X	F
DCGW-134	2002	Colluvium	F	F
DCGW-135	2002	Colluvium	F	F
DCGW-136	2002	Colluvium	X	F
DCGW-137	2002	Colluvium	X	F
DCGW-138	2002	Colluvium	X	--

Notes: X Indicates measurement of depth to groundwater, field parameters, and collection of sample(s) for laboratory analysis
F Indicates only measurement of depth to water and field parameters
W Continuous water level monitoring
-- Indicates no monitoring

TABLE 4
OTHER DISTRICT MONITORING WELLS
New World Mining District Response and Restoration Project

Well No.	Year Installed	Completion Formation	2007 Monitoring Event					
			May	June	July	Aug	Sep	Continuous
Fisher Creek Area								
EPA-11	1996	Tertiary Intrusive Dike	--	--	X	--	--	--
FCGW-100	2004	Glengarry Adit Workings	--	--	X	--	--	--
EPA-12	1996	Scotch Bonnet Diorite	--	--	X	--	--	--
MW-1	1989	Wolsey Shale	--	--	X	--	--	--
MW-9A	1990	Alluvium	--	--	X	--	--	--
MW-9B	1990	Precambrian	--	--	X	--	--	--
MW-10A	1990	Alluvium	--	--	X	--	--	--
MW-10B	1991	Precambrian	--	--	X	--	--	--
MW-11	1990	Precambrian	--	--	X	--	--	--
SB-16	1991	Precambrian	--	--	--	X	--	--
Tracer-5	1997	Fisher Mtn. Intrusive	--	--	X	--	--	--
New World Waste Repository								
SBGW-105T	1999	Till	X	X	--	--	--	W
SBGW-105	1999	Granite	X	X	--	--	--	--
SBGW-107T	1999	Till	X	X	--	--	--	W
SBGW-107	1999	Granite	X	X	--	--	--	--
SBGW-108T	1999	Till	X	X	--	--	--	--
SBGW-108	1999	Granite	X	X	--	--	--	--

Notes: X Indicates measurement of depth to groundwater, field parameters, and collection of sample(s) for laboratory analysis
F Indicates only measurement of depth to water and field parameters
W Continuous water level monitoring
-- Indicates no monitoring

2.2.1 Long-Term Monitoring

Long-term groundwater monitoring was conducted at 13 monitoring wells during July and August 2007 when groundwater levels were at or near seasonal highs. These stations have been monitored consistently since 1999 and occasionally during the previous 15 years, depending on the date of installation. Wells monitored for long-term monitoring purposes included three wells in the McLaren Pit area and 10 wells in Fisher Creek (**Figures 4** and **5** and

Tables 3 and **4**). Monitoring included measuring depth to water, purging wells, measuring field parameters using a down-hole multi-probe, collecting samples, and submitting samples to NAL for analysis of parameters listed in the 2007/2008 Work Plan (Tetra Tech, 2007).

2.2.2 McLaren Pit Monitoring

Supplemental groundwater monitoring was conducted in the McLaren Pit area during 2007 to document changes in groundwater conditions downgradient of the McLaren Pit area following the construction of the McLaren Pit cap (completed in October 2003). In addition to the July monitoring event, groundwater monitoring was conducted at select well locations in September. July monitoring activities consisted of measuring depth to water, purging wells, measuring field parameters, and collecting samples for laboratory analysis (**Table 2**). Samples were shipped to NAL for analysis of parameters listed in the 2007/2008 Work Plan (Tetra Tech, 2007).

September monitoring activities consisted of measuring depth to water, purging wells, and measuring field parameters. Some exceptions to the method for collecting field parameters were made based on specific field conditions. These exceptions are noted in **Table B-2** in **Appendix B-1**.

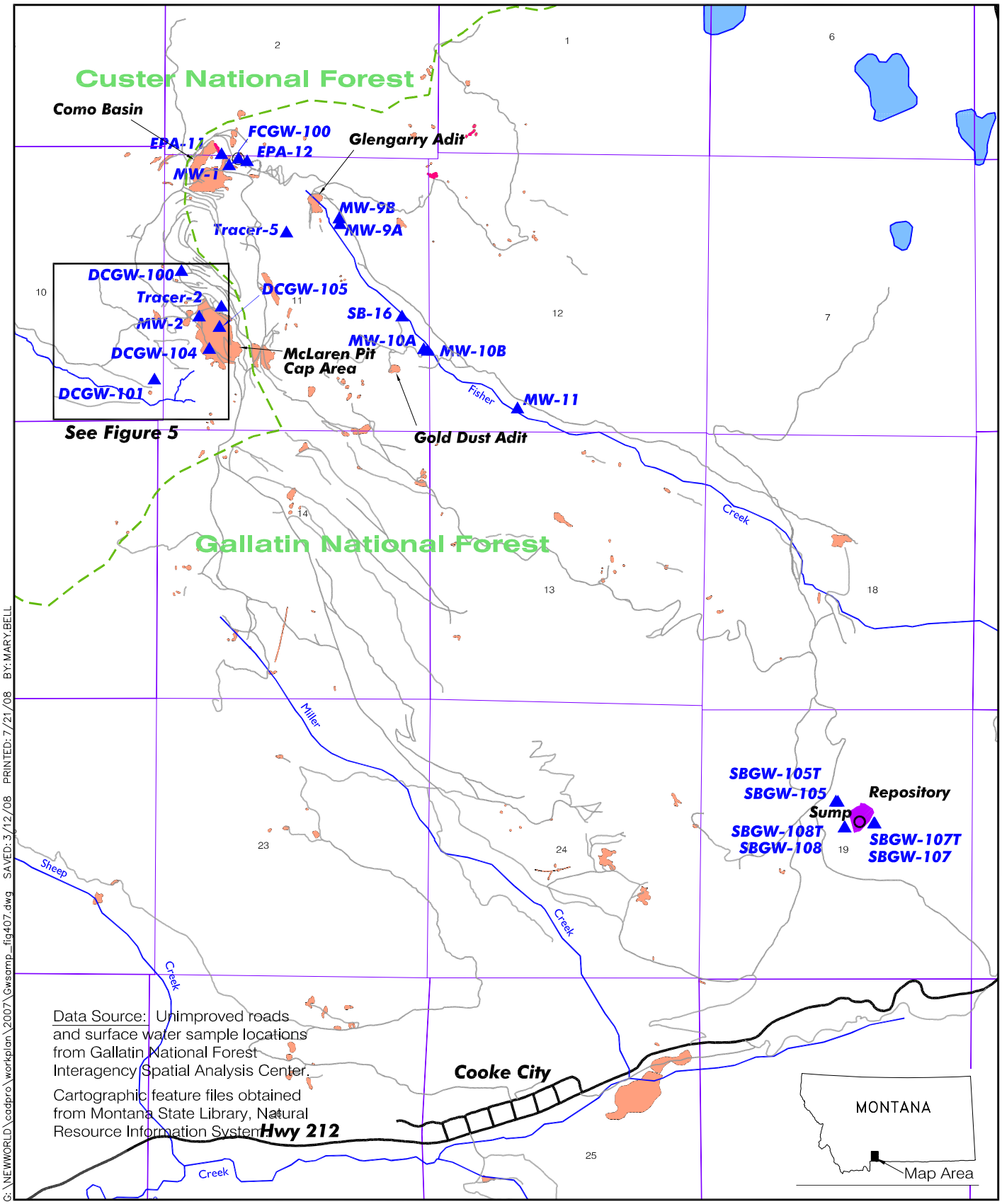
McLaren Pit monitoring also included continuous recording of water levels in two waste rock wells (DCGW-104 and DCGW-105) using down-hole water level instruments. These instruments were installed in wells DCGW-104 and DCGW-105 in May 2005.

2.2.3 New World Waste Repository Well Monitoring

Three well pairs installed in glacial till and bedrock on the margins of the New World Waste Repository were monitored in 2007 to document groundwater conditions adjacent to the repository. The till and bedrock wells were monitored in May (high groundwater levels) and June (low groundwater levels). Monitoring activities consisted of measuring depth to water, measuring field parameters, purging wells, and collecting samples for laboratory analysis. Samples were submitted to NAL for analysis of parameters listed in the 2007/2008 Work Plan (Tetra Tech 2007).

In addition to the May and June monitoring, continuous recording of water levels was conducted in the repository sump and two wells screened in the glacial till (SBGW-105T and SBGW-107T) using water level instrumentation. These instruments were installed in October 2003. Water level data were downloaded regularly throughout the year and the instruments were inspected to insure proper operation. Samples of the sump water were collected in May and September for laboratory analysis. Samples were submitted to NAL for analysis of parameters listed in the 2007/2008 Work Plan (Tetra Tech 2007).

Sump fluids were removed by pumping on September 28 and 29, 2007. The water level instrument in the sump was withdrawn to allow the sump to be emptied of accumulated fluid.



G:\NEWWORLD\cadpro\workplan\2007\Gwsamp_fig407.dwg SAVED: 3/12/08 PRINTED: 7/21/08 BY: MARY.BELL

0 Meters 800

N

DCGW-100 Groundwater Monitoring Location

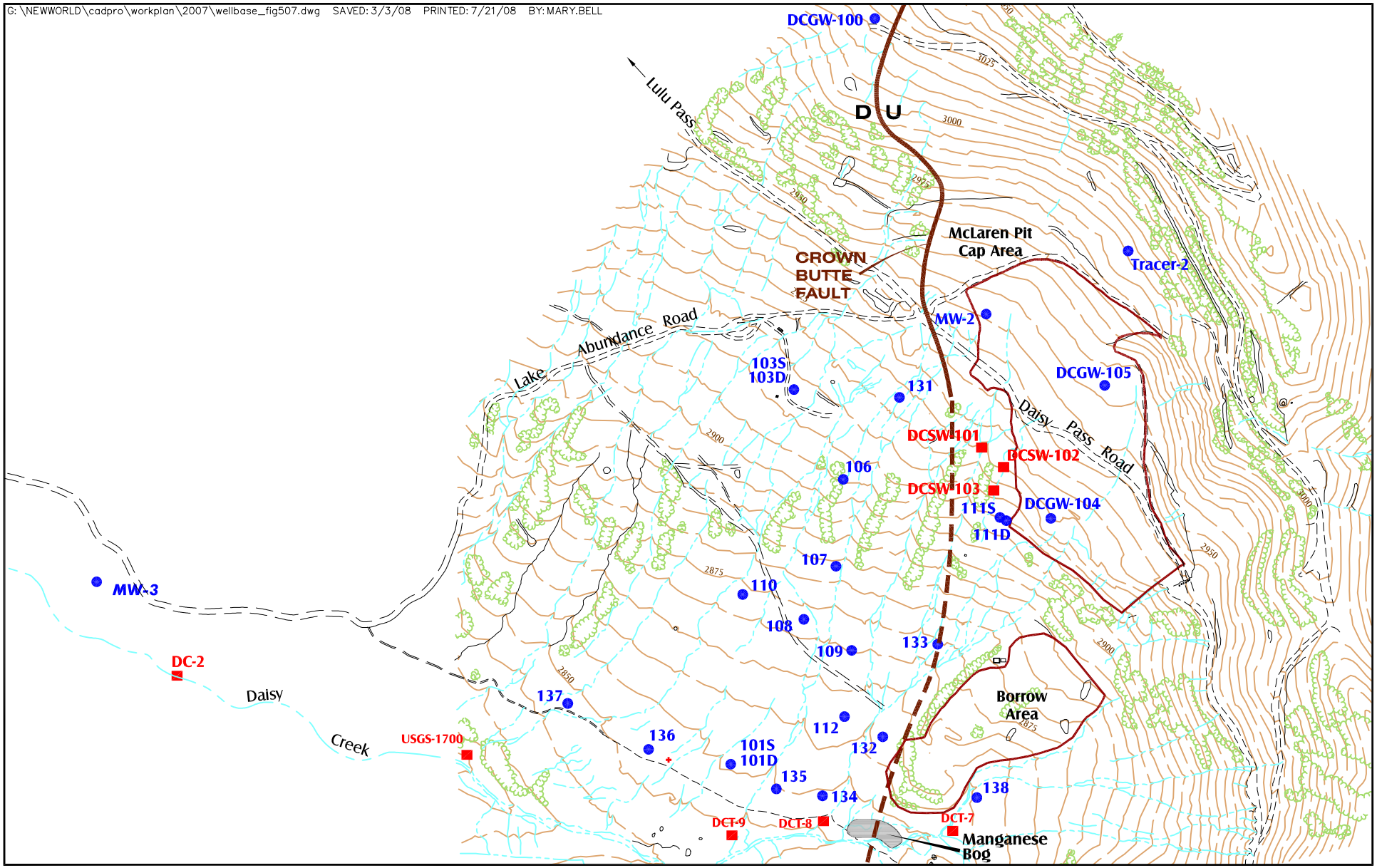
National Forest Boundary

Mine Waste Source Area

Unimproved Road

7561506.110

2007 Groundwater Monitoring Stations
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 4



N

0 10 Meters 50
1:5000
Contour Interval = 5 meters

D U — Crown Butte Fault (D - down thrown; U - up thrown) (dashed where inferred)

Surface Water Station

101 Monitoring Well (DCGW prefix may not be included)

Creek/Drainage

Road/Trail

2007 McLaren Pit Area Monitoring Stations
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 5

7561506.110

2.3 DEVIATIONS FROM 2007/2008 WORK PLAN

Deviations from the 2007/2008 Work Plan are listed below:

- Persistent snow pack prevented the monitoring of surface water stations DCSW-101, DCSW-103, DCT-7, DCT-9 during the June 2007 surface water monitoring event. As a result, these stations were monitored in July. Surface water stations DCSW-102, DCT-8, and DC-2 were monitored again on the same day for loading calculations (**Figure 5**). Therefore, discussions and interpretations of the monitoring data can include surface water monitoring that was conducted in July 2007.
- A water sample was collected from a seep at the base of the rock toe of the New World Waste Repository in June.
- The Upper Little Daisy Adit (M-10 in the Miller Creek drainage) had been listed in the work plan as one of the adit discharges to be monitored. However, due to this adit having been reclaimed, there was no discharge to be monitored.
- The repository sump was sampled in May and September 2007 to determine water chemistry of accumulated fluids and for disposal of the fluids at the Cody, Wyoming sewage treatment pond.
- A failure of pump apparatus resulted in the delay of sampling well SB-16 until August. All other monitoring wells were sampled during July 2007.
- As in previous years, well DCGW-105 could not be monitored in September due to an obstruction at approximately 20 feet deep in the well. Monitoring of well DCGW-105 was completed in July 2007. This obstruction also prevented monitoring in September during 2005 and 2006. The level of groundwater in the well falls below this obstruction in September.

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3.0 RESULTS

Surface water and groundwater data collected for the New World Mining District Response and Restoration Project during 2007 are summarized in this section. Field sample forms and laboratory analytical reports are contained in separate appendices at the end of this report.

3.1 SURFACE WATER

This section presents a discussion of surface water quality data collected in 2007. **Appendix A-1** summarizes flow and laboratory analytical results for surface water stations monitored in 2007. **Appendix A-2** contains the surface water field forms among other supporting documentation. **Appendix C** contains the 2007 field season notes. **Appendix D** contains the laboratory analytical reports and chain of custody forms.

3.1.1 Discussion of Long-Term Surface Water Quality Data - Daisy Creek

Table 5 compares selected 2007 surface water analytical data with corresponding regulatory standards for surface water stations on Daisy Creek and the Stillwater River. The shading and/or color of concentration values for each monitoring station indicate exceedances of regulatory standards or guidelines (e.g., yellow shading indicates exceedance of the acute aquatic life standard). Metals concentrations measured in samples collected from the Daisy Creek and Stillwater River stations in 2007 did not exceed temporary or narrative water quality standards.

Much of the foregoing discussion of the 2007 data for stations DC-2 and DC-5 compares mean concentrations of metals that were measured prior to the completion of the cap over the McLaren Pit waste rock with mean concentrations of metals measured after that date. The construction of the cap was completed in October 2003. These data have been divided into low flow and high flow data sets, with the low flow data defined as any measurement taken during the months of August through May, and the high flow data defined as any measurement taken during the months of June and July.

As in 2006, mean value comparisons were used to measure changes in chemistry since the cap was constructed. As the post-capping data set becomes larger with continued monitoring (currently there are nine low flow data points and four high flow data points), other statistical measures of central tendency may be better suited for the comparisons presented in this 2007 monitoring report.

Station DC-2

Monitoring of station DC-2 during 2007 indicated a continued improvement in water quality since emplacement of the McLaren Pit cap in October 2003. With the cap in place, there is a greater contribution of uncontaminated water during the Spring snowmelt period in upper Daisy Creek. Snowmelt cannot become contaminated by infiltrating into metal and sulfide rich soil, waste materials, and bedrock of the McLaren Pit. In addition, this lack of infiltration in the McLaren Pit is believed to result in lower stream flow of the tributaries to upper Daisy Creek during “low flow” periods (August to April) (Maxim, 2005 and **Appendix A-1, Table A-3**).

TABLE 5
DAISY CREEK/STILLWATER RIVER SURFACE WATER RESULTS COMPARISON TO STANDARDS
2007 MONITORING EVENTS
New World Mining District Response and Restoration Project

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	DC-2 (Total Recoverable)			
				Narrative Water Quality Standard(1)	Apr-07	Jun-07	Sep-07
Aluminum(3)	0.75	0.087	NA	**28.4**	8.30	3.70	13.4
Cadmium	0.00213(4)	0.00027(4)	0.005	**0.009**	0.0036	0.0004	0.0042
Copper	0.0140(4)	0.0093(4)	1.3	**8.064**	1.44	0.41	3.58
Iron	NA	1	0.3	**29.649**	12.0	5.36	12.90
Lead	0.082(4)	0.0032(4)	0.015	**0.018**	0.003	0.009	0.004
Manganese	NA	NA	0.05	**4.088**	1.76	0.23	2.37
Zinc	0.1198(4)	0.1198(4)	2	**1.104**	0.46	0.07	0.61
Hardness	NA	NA	NA	NA	211	64	270
pH (s.u.)	NA	NA	NA	**2.7**	4.9	6.5	4.1
Flow (cfs)	NA	NA	NA	NA	0.05	10.2	0.15

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	DC-5 (Total Recoverable)				DC-5 (Dissolved)		
				Temporary Water Quality Standard(2)	Apr-07	Jun-07	Sep-07	Apr-07	Jun-07	Sep-07
Aluminum(3)	0.75	0.087	NA	**9.510**	1.23	1.39	4.23	<0.05	<0.05	<0.05
Cadmium	0.00213(4)	0.00027(4)	0.005	**0.004**	0.0007	0.0002	0.0014	0.0006	0.0001	0.0010
Copper	0.0140(4)	0.0093(4)	1.3	**3.530**	0.250	0.019	1.160	0.026	0.020	0.018
Iron	NA	1	0.3	**6.830**	1.03	1.73	5.04	<0.01	0.06	<0.01
Lead	0.082(4)	0.0032(4)	0.015	NA	<0.001	0.003	0.002	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	**1.710**	0.32	0.099	0.740	0.34	0.072	0.740
Zinc	0.1198(4)	0.1198(4)	2	**0.540**	0.09	0.02	0.22	0.05	<0.01	0.07
Hardness	NA	NA	NA	NA	156	55	207			
pH (s.u.)	NA	NA	NA	**4.6**	7.8	7.9	7.6			
Flow (cfs)	NA	NA	NA	NA	0.43	30.7	0.42			

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SW-7 (Total Recoverable)				SW-7 (Dissolved)		
				Temporary Water Quality Standard(2)	Apr-07	Jun-07	Sep-07	Apr-07	Jun-07	Sep-07
Aluminum(3)	0.75	0.087	NA	**0.670**	<0.05	0.25	0.11	<0.05	<0.05	<0.05
Cadmium	0.00213(4)	0.00027(4)	0.005	NA	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0140(4)	0.0093(4)	1.3	**0.200**	0.002	0.041	0.007	0.001	0.009	0.002
Iron	NA	1	0.3	**1.320**	0.19	0.31	0.16	0.05	0.01	<0.01
Lead	0.082(4)	0.0032(4)	0.015	**0.013**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	**0.086**	0.018	0.012	0.024	0.018	0.016	0.020
Zinc	0.1198(4)	0.1198(4)	2	**0.049**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	NA	102	71	121			
pH (s.u.)	NA	NA	NA	**5.5**	7.6	7.9	7.9			
Flow (cfs)	NA	NA	NA	NA	1.89	81.1	2.51			

NOTES: Shading/coloring indicates exceedance of respectively shaded/colored regulatory standard
Metal parameter values are reported in total recoverable and dissolved concentrations
mg/l = milligrams per liter; s.u. = standard units; cfs = cubic feet per second
-- - No measurement or analysis conducted; NA = not applicable
< - Indicates analyte not detected above laboratory Practical Quantitation Limit (PQL)
NA - Not applicable
(1) - Narrative Water Quality Standards apply to **any point** in affected stream segments and are included in the rule for temporary water quality standards. As with the temporary standards, narrative standards are calculated as the mean plus 2 standard deviations
(2) - Temporary Water Quality Standards are set in accordance to the rule adopted by the Board of Environmental Review. These standards apply to specific surface water sampling stations and shall not be exceeded more than 3% of the time
(3) - Aluminm standard applies to dissolved concentrations in water with a pH between 6.6 to 9.0 s.u.
(4) - Based on 100 mg/l hardness
pH - Lab pH used in April, June, and September 2007 measurements

At surface water station, DC-2, water quality was poor and acidic in April and September (**Table 5**), which is consistent with previous data collected at this station during these months, both pre- and post-capping. In June, the pH of water sampled at this station was only slightly acidic and metals concentrations, with the exception of lead, were much lower. This same condition was observed in June monitoring events at this station during 2004, 2005, and 2006. As in 2006, concentrations of dissolved metals were not analyzed in 2007 at station DC-2 because previous monitoring of dissolved concentrations showed that the total recoverable concentration is about the same as the dissolved concentration. Based on the very acidic pH measured at this station, this result is expected, as metals tend to stay in the dissolved form in acidic environments.

Cadmium, copper, iron, and zinc exceeded acute and/or chronic aquatic life standards in all three 2007 monitoring events at station DC-2 (**Table 5**). In addition, lead exceeded the chronic aquatic life standard during June and September. Human health standards and/or guidelines for copper, iron, and manganese were also exceeded in most samples collected from station DC-2.

Figure 6 shows copper, iron, and zinc concentrations over time and vs. flow for this station and **Figure 7** shows the percent decrease/increase in mean metal concentrations and load when comparing pre-capping data to post-capping data (post-October 2003) for both high flows (June and July data) and low flows (August through May data). Supporting data for these figures are presented in **Table A-3** in **Appendix A-1**. Concentration vs. time graphs indicate that post-capping metal concentrations during high flows have been some of the lowest measured. These graphs also indicate that post-capping, low flow monitoring events exhibit lower metal concentrations in comparison with pre-capping metal concentrations (**Figure 6**). Post-capping decreases in metal concentrations during high flow range averaged 60% for aluminum, cadmium, copper, iron, lead, manganese, and zinc. Post-capping decreases in these metal concentrations during low flow range averaged 12%. Mean zinc concentration increased slightly (about 5%) during low flow post-capping (**Figure 7**).

Mean low flows after capping were about 65% lower than pre-capping means, which resulted in more substantial decreases in metal loads during low flow. Post-capping decreases in aluminum, cadmium, copper, iron, lead, manganese, and zinc loads during low flow averaged 52%. Post-capping decreases in load during high flow averaged 36% although lead load increased 7% (**Figure 7** and **Appendix A-1, Table A-3**).

Station DC-5

At station DC-5, pH of the water increases notably from that measured at station DC-2 due to the addition of more carbonate-rich water from bedrock and tributary sources located downstream of station DC-2 **(Figure 8)**. Total recoverable trace metal concentrations are also considerably lower at this station (**Table 5**), as the higher pH results in precipitation of much of the metals load upstream of DC-5.

Copper and iron exceeded acute or chronic aquatic life standards in all three 2007 monitoring events (**Table 5**). Cadmium and zinc exceeded acute or chronic aquatic life standards in at least one of the three monitoring events. Iron and manganese exceeded human health guidelines during all three sampling events. The temporary water quality standard for manganese was exceeded in the April monitoring event. **Table 5** also shows dissolved metal

concentrations measured at station DC-5. Dissolved concentrations of cadmium and copper exceeded aquatic water quality standards in two of the three monitoring events. Nearly all of the cadmium and manganese measured at station DC-2 exists in dissolved concentrations .

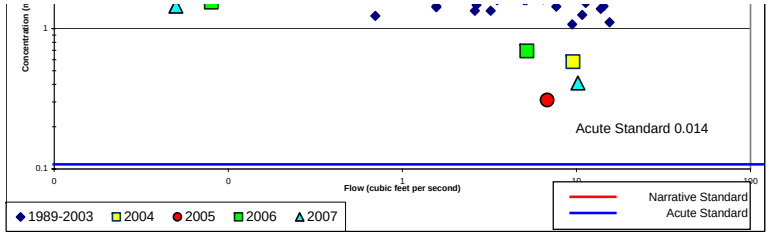
Figure 9 shows copper, iron, and zinc concentrations over time and vs. flow for this station, and **Figure 10** shows the percent decrease/increase in mean metals concentrations and load when comparing pre-capping data to post-capping data (post-October 2003) for both high flows (June and July data) and low flows (August through May data). Supporting data for these figures are presented in **Table A-3** in **Appendix A-1**. Concentration versus time graphs indicate that post-capping metal concentrations during high flows have been some of the lowest measured. These graphs also indicate that many of the post-capping, low flow monitoring events exhibit lower metal concentrations in comparison with pre-capping metal concentrations (**Figure 6**). Post-capping decreases in metals concentrations during high flow averaged 50% for aluminum, cadmium, copper, iron, lead, manganese, and zinc. Post-capping decreases in these metal concentrations during low flow averaged 35%. Mean low flows after capping at this station were 10% higher than pre-capping means which resulted in less of a reduction in the metal loads during low flow compared with station DC-2. Post-capping decreases in aluminum, cadmium, copper, iron, lead, manganese, and zinc loads during low flow averaged 24%. Post-capping decreases in load during high flow averaged 32% although lead load increased 11% (**Figure 10 and Appendix A-1, Table A-3**).

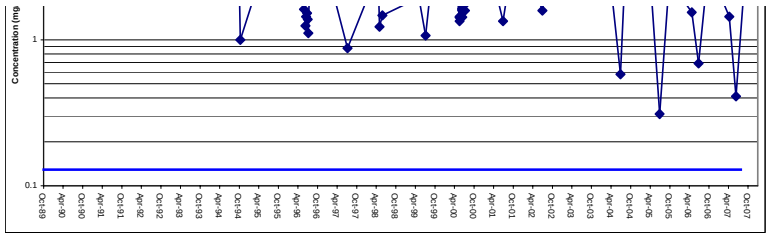
Station USGS-11890

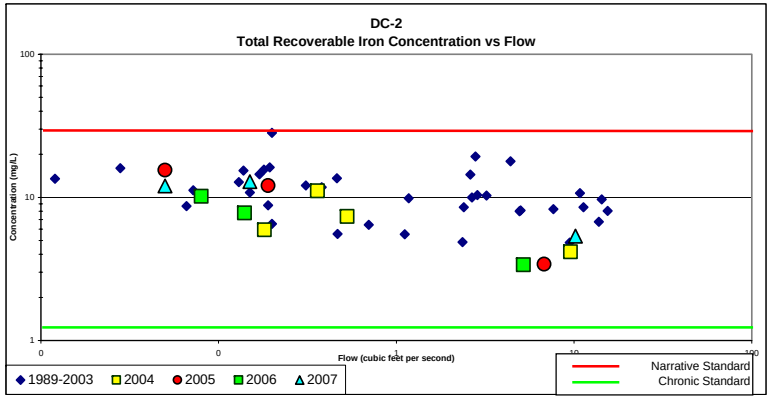
Station USGS-11890 was monitored in September 2007. The pH of the water at this station increases from that measured at station DC-5 due to the addition of more carbonate-rich water from the bedrock and tributary sources of the Stillwater River. Total recoverable trace metal concentrations are also considerably lower at this station (**Table 5**), due to its confluence with the Stillwater River.

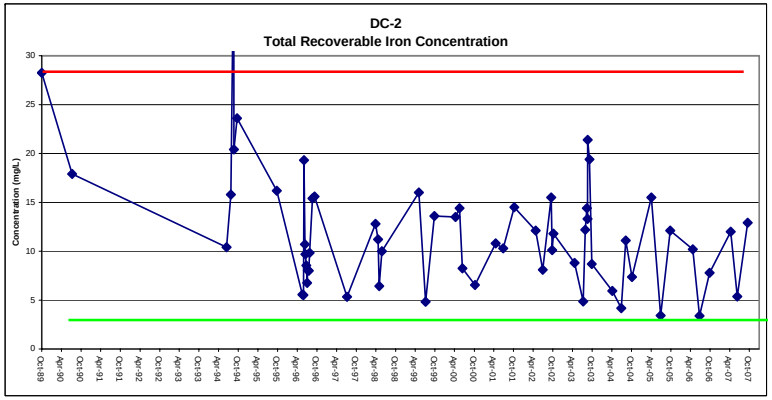
Cadmium, copper, and iron exceeded acute or chronic aquatic life standards in the September 2007 monitoring event (**Table 5**). Iron and manganese exceeded human health guidelines during this event. **Table 5** also shows dissolved metal concentrations measured at the station. Dissolved cadmium exceeded the chronic aquatic water quality standard. Nearly all of the cadmium and manganese measured at station USGS-11890 exists in dissolved concentrations.

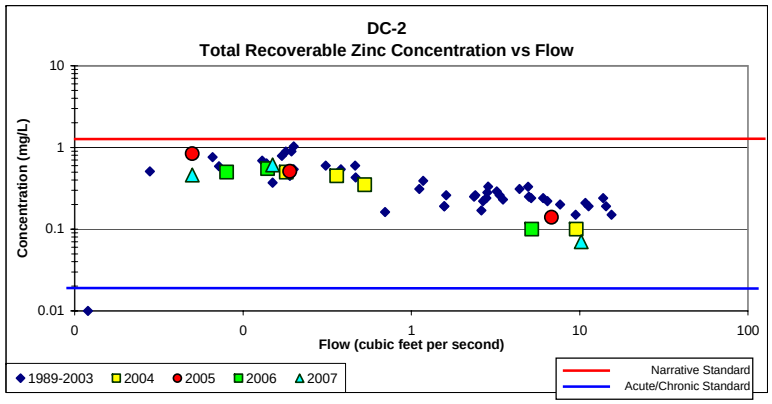
This location was previously monitored during synoptic sampling activities on August 26, 1999 (Nimick and Cleasby, 1999) and was identified as site “5,839”. Flow and selected metal concentrations were evaluated at this station during August 1999 and September 2007. Flow at this site was 30% less (0.96 cfs) in August 1999 than flow measured during September 2007. Concentrations of aluminum, cadmium, copper, iron, lead, manganese, and zinc were higher at this station during August 1999 as compared with September 2007. Concentrations of these metals were at least 41% lower during September 2007, specifically 41% lower in iron and at least 65% lower in aluminum, cadmium, copper, lead, manganese, and zinc as compared with August 1999 monitoring.











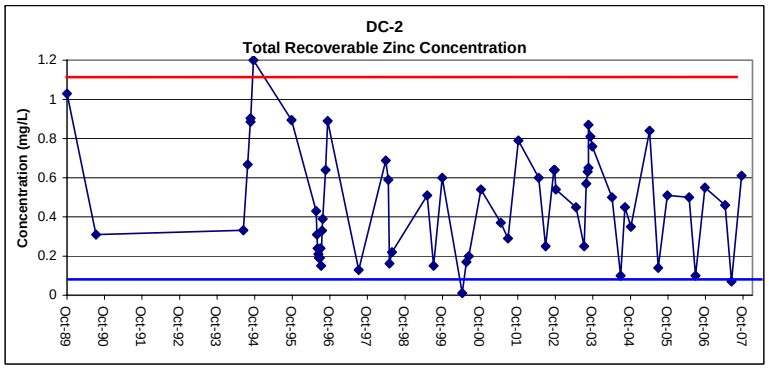
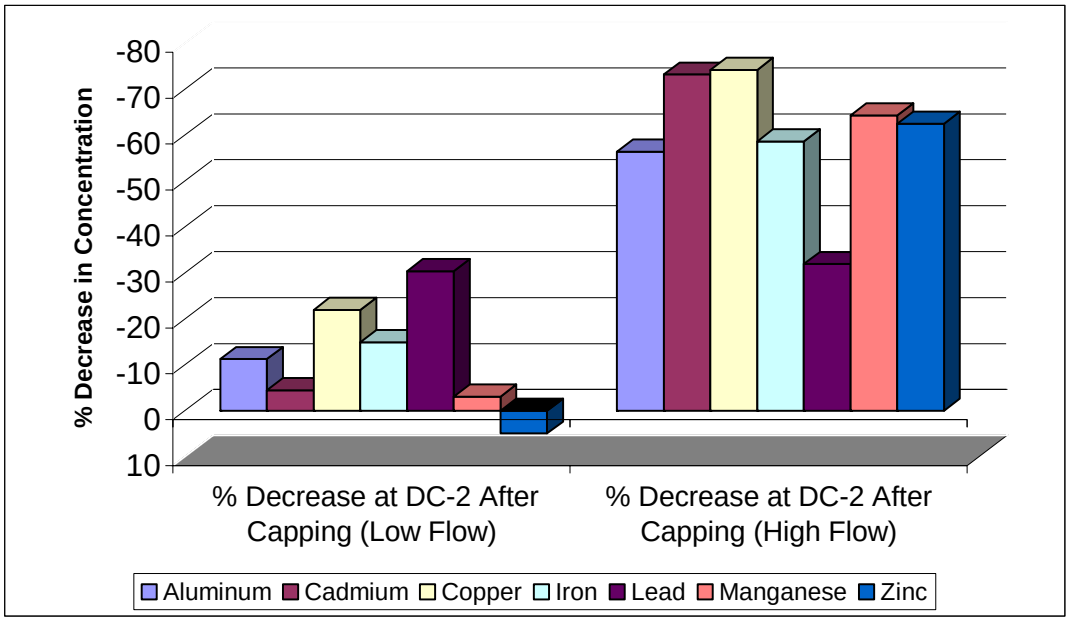


Figure 6 - Concentration and Concentration vs. Flow Graphs for Station DC-2



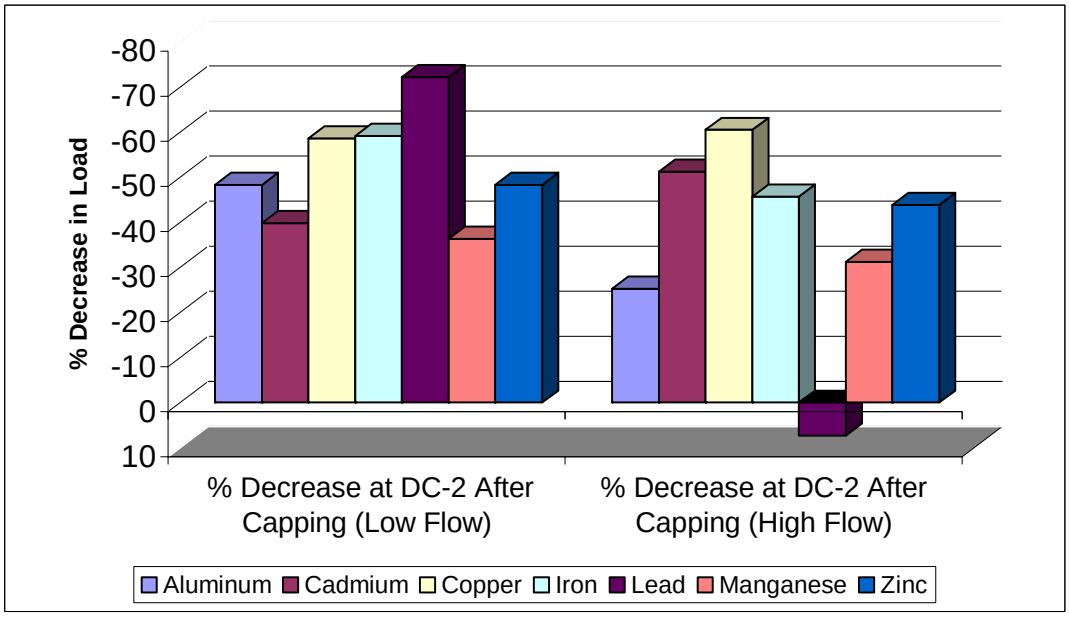


Figure 7. Percent Decrease in Mean Metals Concentrations and Loads at Station DC-2 Compared to McLaren Pit Pre-Capping Means. Calculations based on April, June, and September monitoring events

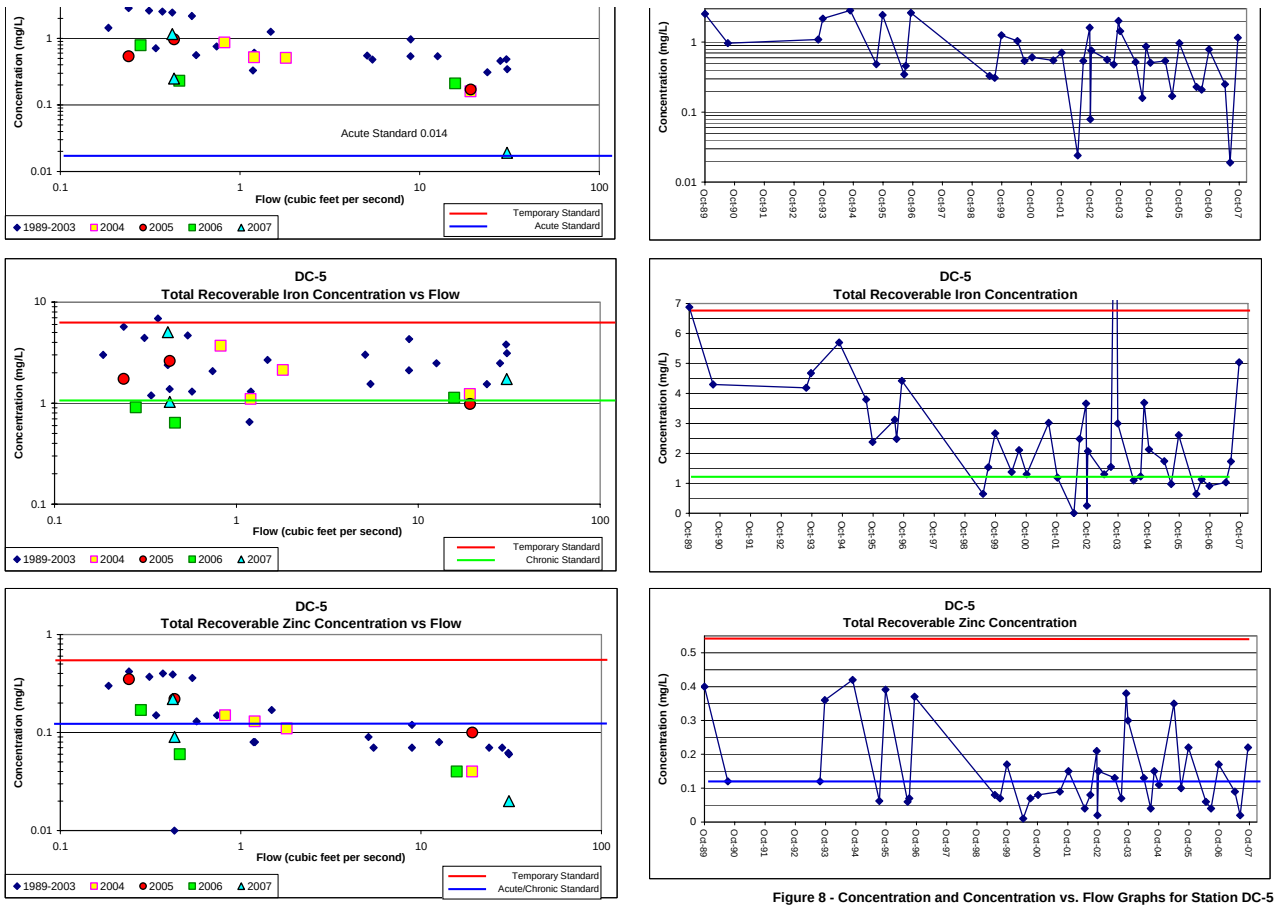
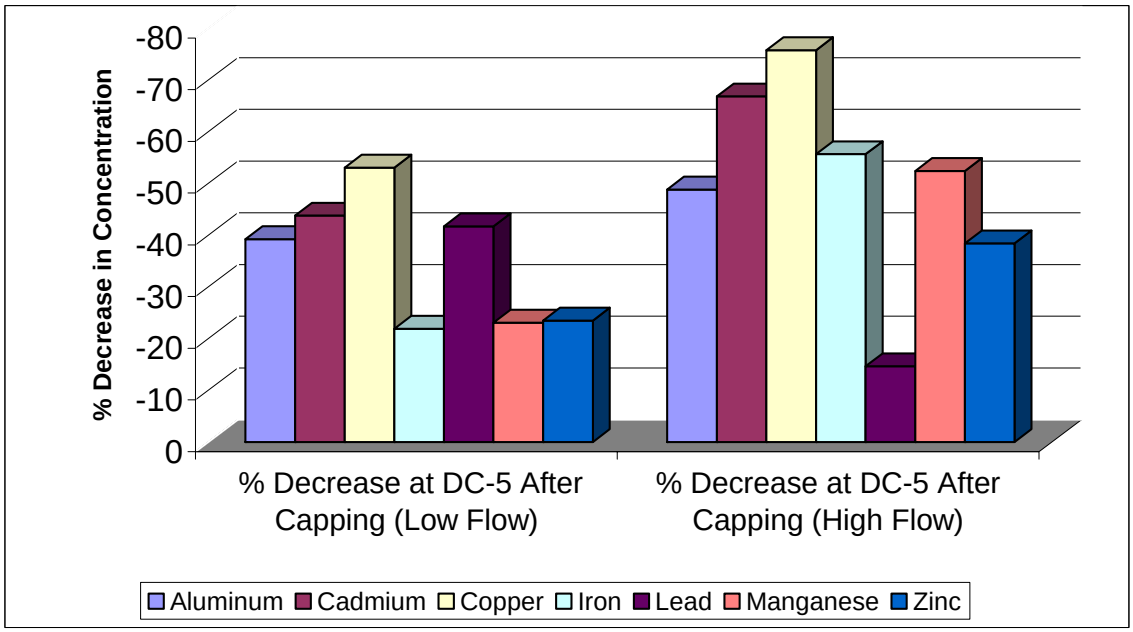


Figure 8 - Concentration and Concentration vs. Flow Graphs for Station DC-5

Station SW-7

Data collected at station SW-7 indicate that total recoverable copper concentrations exceeded the chronic and acute aquatic life standard in June. Iron exceeded the human health guideline in June. Dissolved analyses for trace metal concentrations at SW-7 (**Table 5**) were all below applicable standards or guidelines in 2007, which was also the case from 2004, 2005, and 2006.

Figure 10 shows historic data collected at station SW-7 on the Stillwater River. Copper concentrations measured at this station generally increase as flow increases, while iron and zinc concentrations are not as strongly related to flow conditions (i.e. concentrations increase or decrease independent of flow). The copper data indicate that suspended sediment is entrained during higher flow conditions. Aluminum and copper concentrations presented in **Table 5** support this observation as the total recoverable concentrations measured during high flow in 2007 (June) is almost five times higher than the dissolved concentrations. Dissolved iron concentrations in June were 3% of the total iron, indicating that practically all the iron was in the suspended fraction.



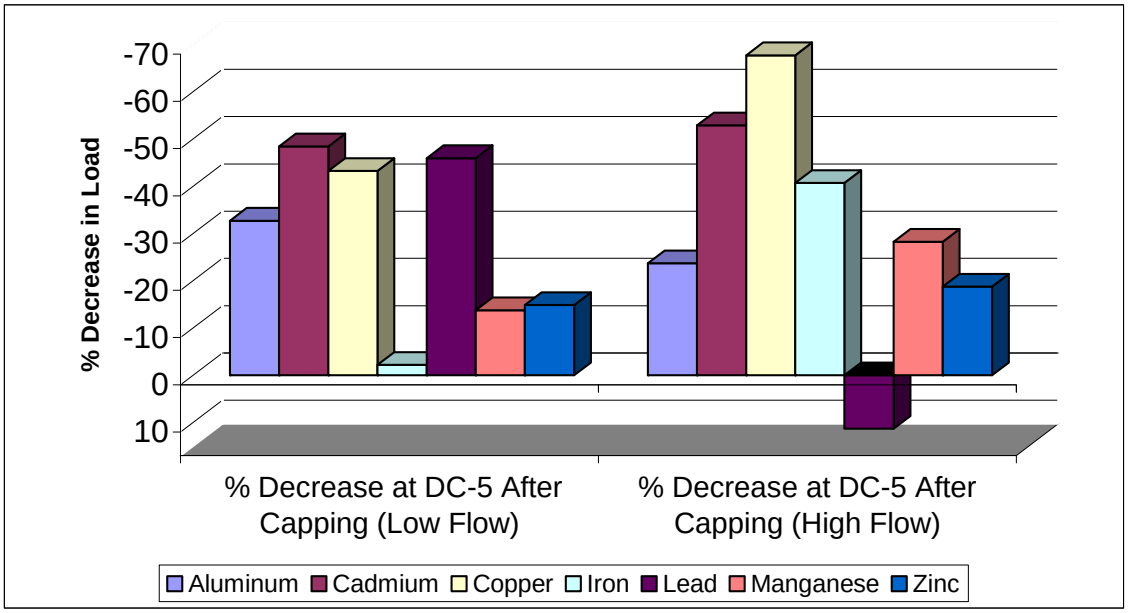
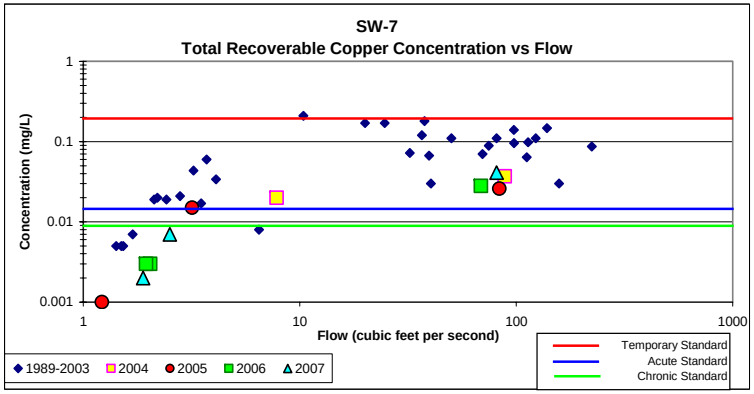
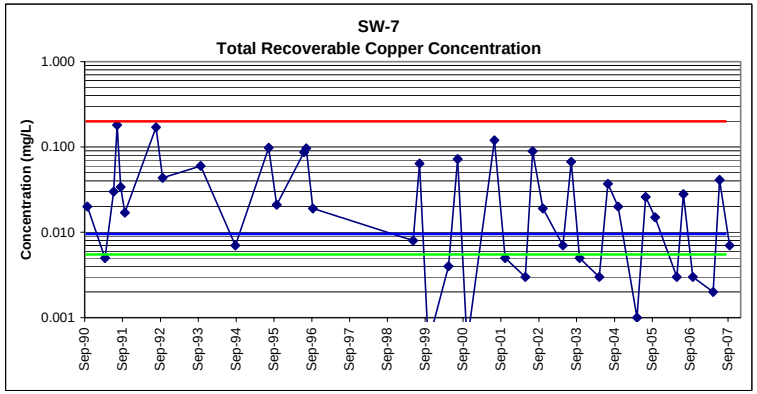
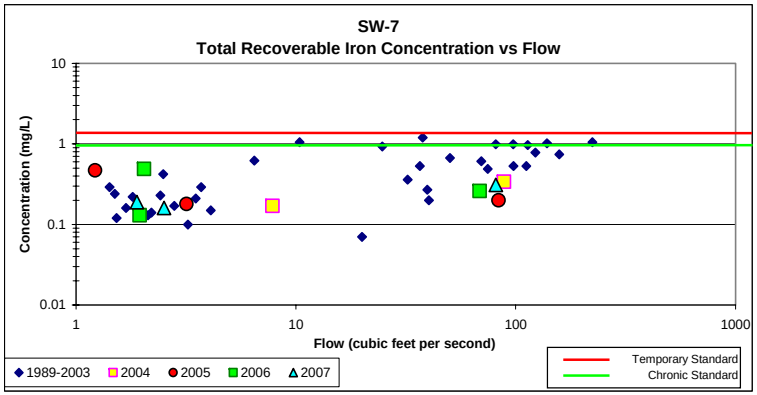
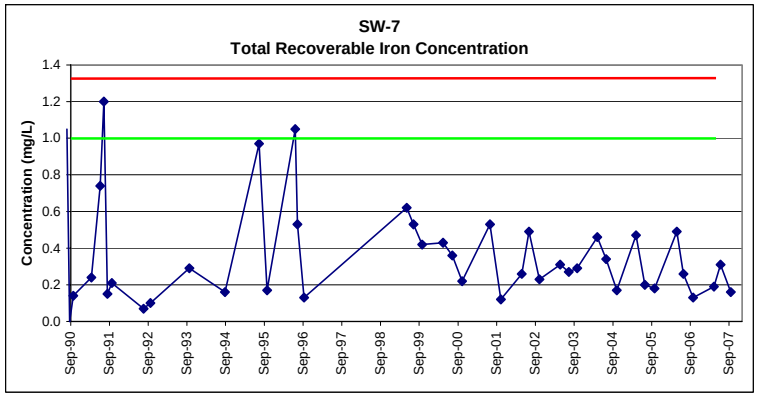


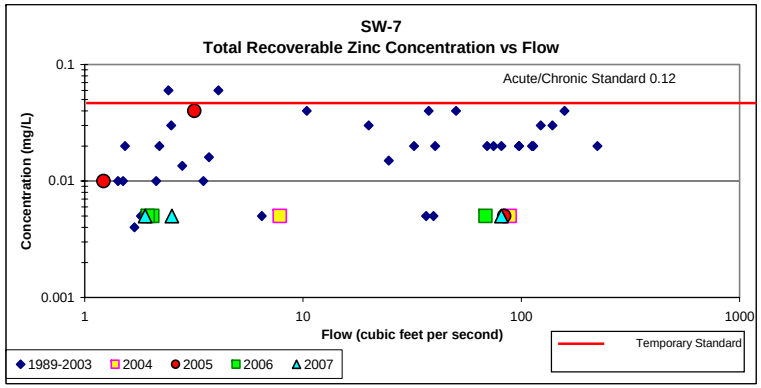
Figure 9. Percent Decrease in Mean Metals Concentrations and Loads at Station DC-5 Compared to McLaren Pit Pre-Capping Means. Calculations based on April, June, and September monitoring events











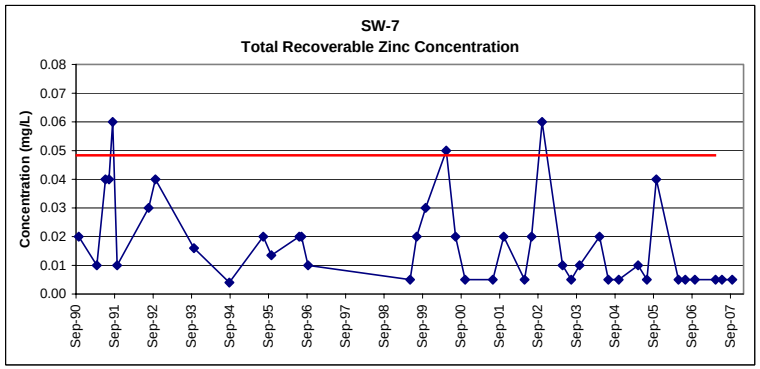


Figure 10 - Concentration and Concentration vs. Flow Graphs for Station SW-7

3.1.2 Discussion of Long-Term Surface Water Quality Data – Fisher Creek

Table 6 compares selected 2007 surface water analytical data with corresponding regulatory standards for surface water stations on Fisher Creek and Clarks Fork Yellowstone River. As in **Table 5**, shading and/or color of the concentration values for each monitoring station indicates which regulatory standard was exceeded. As in Daisy Creek, water quality in Fisher Creek improves downstream, with considerable improvements noted at stations CFY-2 and SW-6 (Clarks Fork Yellowstone River). Metals concentrations measured in samples collected from the Fisher Creek and Clarks Fork Yellowstone River stations in 2007 did not exceed temporary or narrative water quality standards.

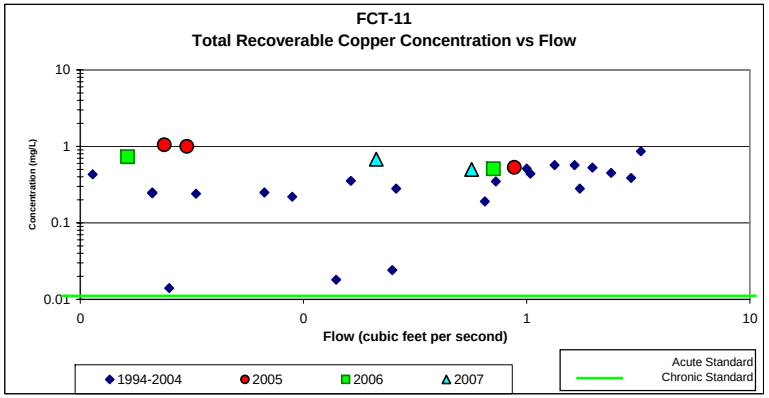
The Como Basin Cap was completed in October 2006. Changes in water quality at supplemental surface water stations FCT-11 and FCT-12 will be discussed below.

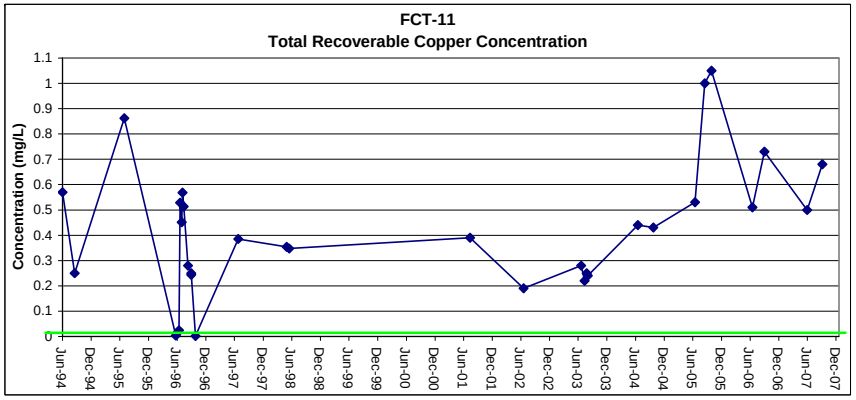
Closure of the Glengarry Adit in September 2004 significantly improved water quality in Fisher Creek as far downstream as station SW-4 (Tetra Tech 2007). Water quality improvements attributed to the Glengarry Adit closure will be discussed in Section 3.1.5 *Discussion of Adit Discharge Monitoring*.

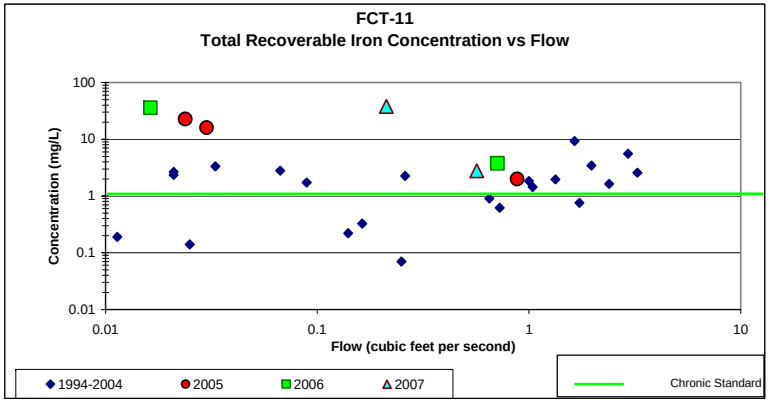
Stations FCT-11 and FCT-12

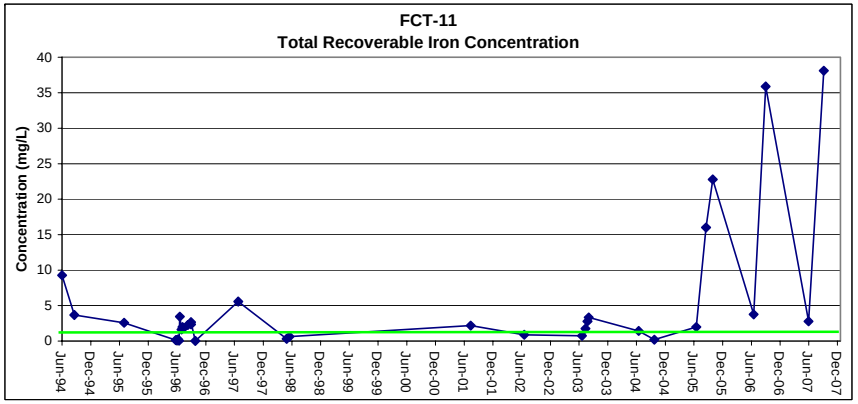
Surface water station FCT-11 is the main tributary draining the Como Basin. At station FCT-11, pH was near neutral in June (6.9 s.u.) and strongly acidic in September (3.1 s.u.). Specific Conductivity was 175 µmhos/cm in June and 940 µmhos/cm in September. Concentration vs. flow and time graphs at station FCT-11 (**Figure 11**) indicate that metal concentrations increased when the Como Basin response action (capping) was initiated (2005) and have remained at or above mean concentrations.

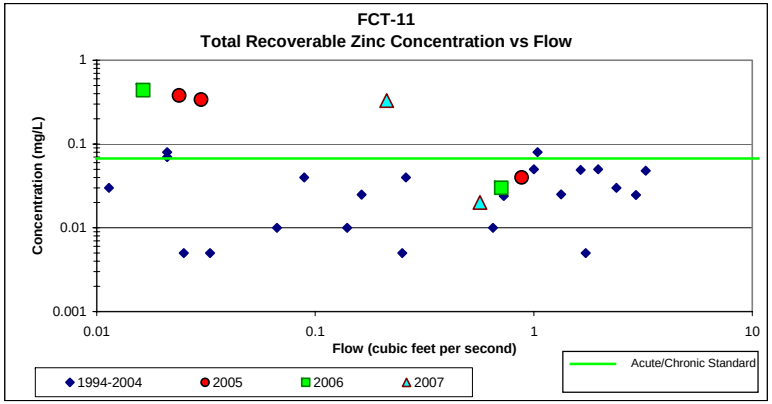
Surface water station FCT-12 drains an undisturbed area of mineralized Fisher Mountain Intrusive porphyry rock (south of the Como Basin). At station FCT-12, pH was acidic in June (4.7 s.u.) and September (4.1 s.u.). Specific Conductivity was 36 µmhos/cm in June and 142 µmhos/cm in September. Concentration vs. flow and time graphs at station FCT-12 (**Figure 12**) indicate no significant change in metal concentrations through initiation and completion of the Como Basin response action.











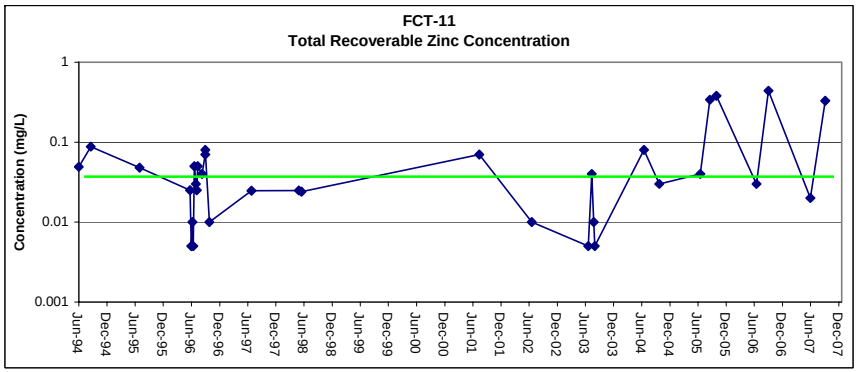


Figure 11 - Concentration and Concentration vs. Flow Graphs for Station FCT-11

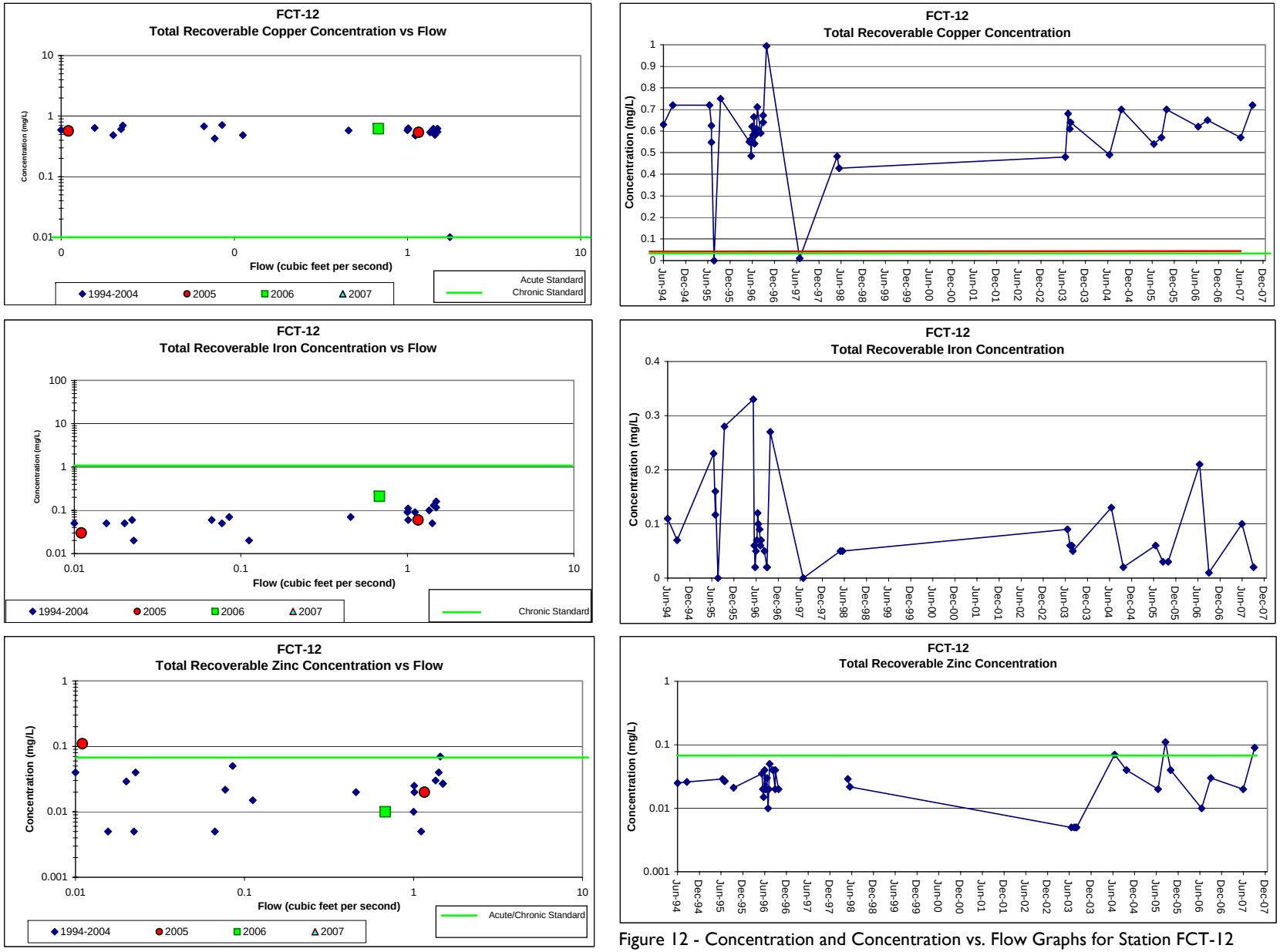


Figure 12 - Concentration and Concentration vs. Flow Graphs for Station FCT-12

Station SW-3

At surface water station, SW-3, water quality was poor and acidic in each of the three 2007 monitoring events, which is consistent with previous data collected at this station. Total recoverable cadmium, copper, iron, lead, and zinc exceeded acute and/or chronic aquatic life standards in at least two of the three 2007 monitoring events (**Table 6**). Human health guidelines for iron and manganese were exceeded during all three 2006 monitoring events.

Concentration vs. flow and time graphs for copper, iron, and zinc are presented in **Figure 13**. Data collected since closure of the Glengarry Adit in September 2004, indicate that metal concentrations have decreased to some of the lowest levels measured during high and low flow monitoring events.

Figure 14 compares mean concentrations measured at station SW-3 prior to the closure of the Glengarry Adit compared with mean concentrations of metals measured after the adit closure was completed in September 2004. These data are separated into low flow and high flow data sets, with the low flow data defined as any measurement taken during the months of August through May, and the high flow data defined as any measurement taken during the months of June and July. The percent decrease in low flow metal concentrations since the adit was closed range from 7% (for copper) to 83% (for iron). For high flow, the decrease in metal concentrations range from 16% (for aluminum) to 74% (for cadmium).

In terms of load, low flow loads have been reduced by more than 55% (92% for iron), partly due to the fact that post-adit closure mean flows have decreased (52% lower than pre-closure flows, **Table A-4, Appendix A-1**). Decreases in high flow meal loads range from 6% for aluminum, 58% for iron, and 64% for cadmium compared with respective pre-adit closure metal loads (**Figure 14**). As mentioned previously, characterizing the central tendency of a data set using the mean value is just one way to describe changes observed in chemistry at this station since the Glengarry was closed.

As in 2006, dissolved concentrations of metals were not measured in 2007 at station SW-3 because previous monitoring of dissolved concentrations (Maxim, 2006b) showed that the total recoverable concentration is about the same as the dissolved concentration. Based on the acidic pH measured at this station, this result is expected, as metals tend to stay in the dissolved form in strongly acidic environments.

TABLE 6
FISHER CREEK/CLARKS FORK RIVER SURFACE WATER RESULTS COMPARISON TO STANDARDS
2007 MONITORING EVENTS
New World Mining District Response and Restoration Project

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SW-3 (Total Recoverable) Narrative Water Quality Standard[1]	Apr-07	Jun-07	Sep-07
Aluminum[3]	0.75	0.087	NA	**4.54**	2.14	1.72	2.51
Cadmium	0.001054[3]	0.000162[3]	0.005	**0.002**	0.001	0.0002	0.0008
Copper	0.0073[3]	0.00516[3]	1.3	**1.256**	0.75	0.32	0.84
Iron	NA	1	0.3	**9.259**	0.87	2.46	1.26
Lead	0.0338[3]	0.0013[3]	0.015	**0.01**	0.001	0.002	0.002
Manganese	NA	NA	0.05	**1.718**	0.45	0.13	0.57
Zinc	0.067[3]	0.067[3]	2	**0.225**	0.14	0.01	0.12
Hardness	NA	NA	NA	NA	56	31	62
pH (s.u.)	NA	NA	NA	**2.1**	4.0	5.8	3.9
Flow (cfs)	NA	NA	NA	NA	0.065	6.94	0.14

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SW-4 (Total Recoverable) Narrative Water Quality Standard[1]	Apr-07	Jun-07	Sep-07	SW-4 (Dissolved) Apr-07	Jun-07	Sep-07
Aluminum[3]	0.75	0.087	NA	**0.740**	<0.05	0.30	0.07	<0.05	<0.05	<0.05
Cadmium	0.001054[4]	0.000162[4]	0.005	**0.001**	0.0002	<0.0001	0.0002	0.0002	<0.0001	0.0002
Copper	0.0073[4]	0.00516[4]	1.3	**0.172**	0.038	0.069	0.044	0.031	0.026	0.032
Iron	NA	1	0.3	**1.726**	0.02	0.27	0.05	<0.01	0.02	<0.01
Lead	0.0338[4]	0.0013[4]	0.015	**0.005**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	**0.790**	0.014	0.020	0.033	0.012	0.019	0.033
Zinc	0.067[4]	0.067[4]	2	**0.660**	0.04	<0.01	0.02	0.04	<0.01	0.03
Hardness	NA	NA	NA	NA	45	31	59			
pH (s.u.)	NA	NA	NA	**5.241**	6.4	7.3	7.0			
Flow (cfs)	NA	NA	NA	NA	0.58	46.70	0.88			

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	CFY-2 (Total Recoverable) Temporary Water Quality Standard[2]	Apr-07	Jun-07	Sep-07	CFY-2 (Dissolved) Apr-07	Jun-07	Sep-07
Aluminum	0.75	0.087	NA	**0.470**	<0.05	0.14	<0.05	<0.05	<0.05	<0.05
Cadmium	0.001054[4]	0.000162[4]	0.005	NA	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0073[4]	0.00516[4]	1.3	**0.110**	0.005	0.040	0.008	0.005	0.019	0.005
Iron	NA	1	0.3	**0.750**	<0.01	0.13	0.01	<0.01	0.02	<0.01
Lead	0.0338[4]	0.0013[4]	0.015	**0.002**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	**0.082**	<0.003	0.010	<0.003	<0.003	0.012	<0.003
Zinc	0.067[4]	0.067[4]	2	**0.044**	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Hardness	NA	NA	NA	NA	42	33	54			
pH (s.u.)	NA	NA	NA	**5.7**	6.8	7.4	7.3			
Flow (cfs)	NA	NA	NA	NA	0.84	43.4	0.92			

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SW-6 (Total Recoverable) Narrative Water Quality Standard[1]	Apr-07	Jun-07	Sep-07	SW-6 (Dissolved) Apr-07	Jun-07	Sep-07
Aluminum[3]	0.75	0.087	NA	**0.763**	<0.05	0.07	<0.05	<0.05	<0.05	<0.05
Cadmium	0.001054[4]	0.000162[4]	0.005	**0.03472**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0073[4]	0.00516[4]	1.3	**0.076**	0.002	0.018	0.003	0.002	0.010	0.002
Iron	NA	1	0.3	**1.132**	<0.01	0.08	<0.01	<0.01	0.01	<0.01
Lead	0.0338[4]	0.0013[4]	0.015	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	**0.03415**	<0.003	<0.003	<0.003	<0.003	0.004	<0.003
Zinc	0.067[4]	0.067[4]	2	**0.11032**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	NA	31	19	47			
pH (s.u.)	NA	NA	NA	**5.7**	6.7	7.5	7.5			
Flow (cfs)	NA	NA	NA	NA	4.04	101.25	1.90			

NOTES: Shading/coloring indicates exceedance of respectively shaded/colored regulatory standard
Metal parameter values are reported in total recoverable and dissolved concentrations
mg/l = milligrams per liter; s.u. = standard units; cfs = cubic feet per second
-- - No measurement or analysis conducted; NA = not applicable
< - Indicates analyte not detected above laboratory Practical Quantitation Limit (PQL)
NA - Not applicable
(1) - Narrative Water Quality Standards apply to **any point** in affected stream segments and are included in the rule for temporary water quality standards. As with the temporary standards, narrative standards are calculated as the mean plus 2 standard deviations
(2) - Temporary Water Quality Standards are set in accordance to the rule adopted by the Board of Environmental Review. These standards apply to specific surface water sampling stations and shall not be exceeded more than 3% of the time
(3) - Aluminm standard applies to dissolved concentrations in water with a pH between 6.6 to 9.0 s.u.
(4) - Based on 50 mg/l hardness
pH - Lab pH used in April, June, and September 2007 measurements

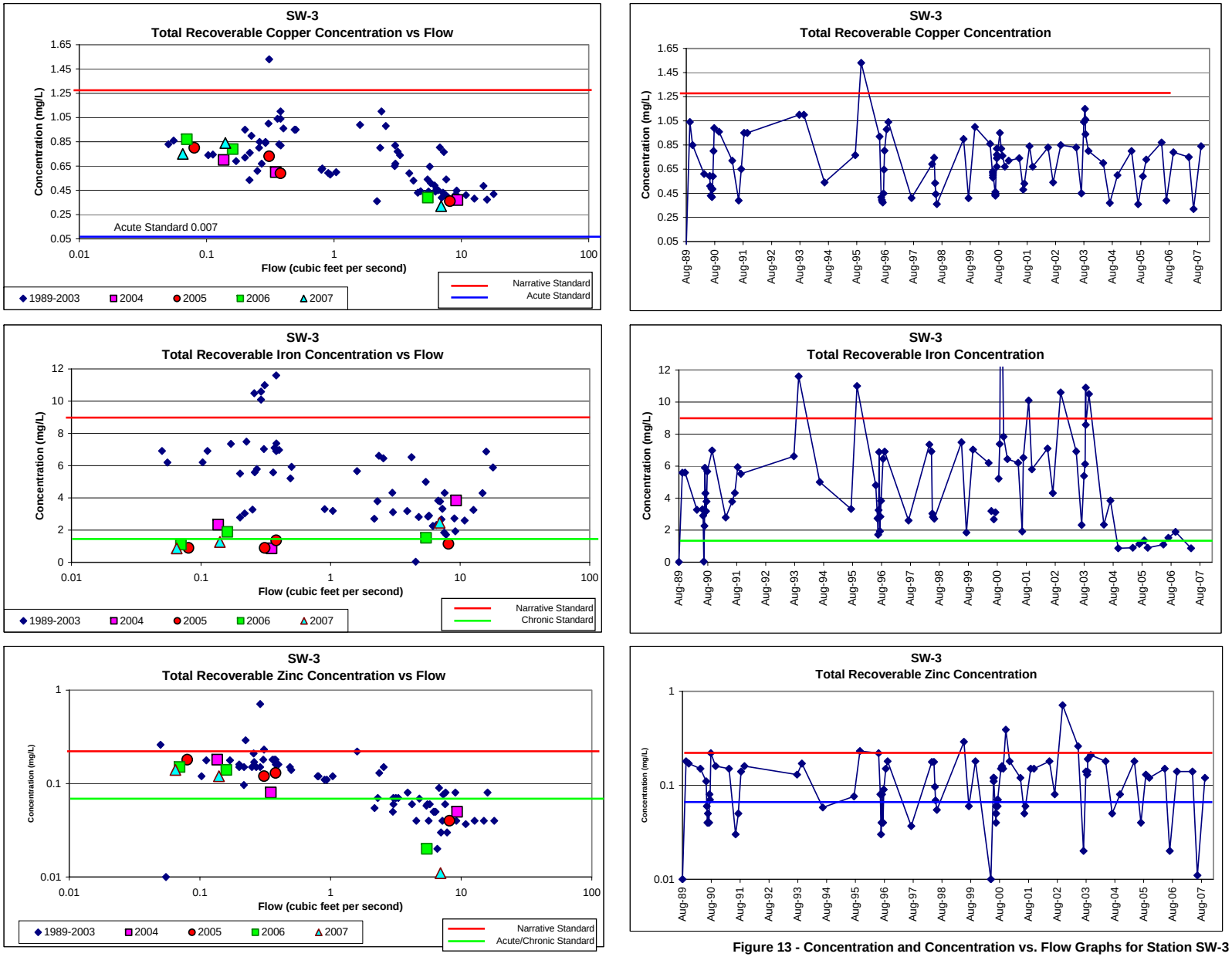
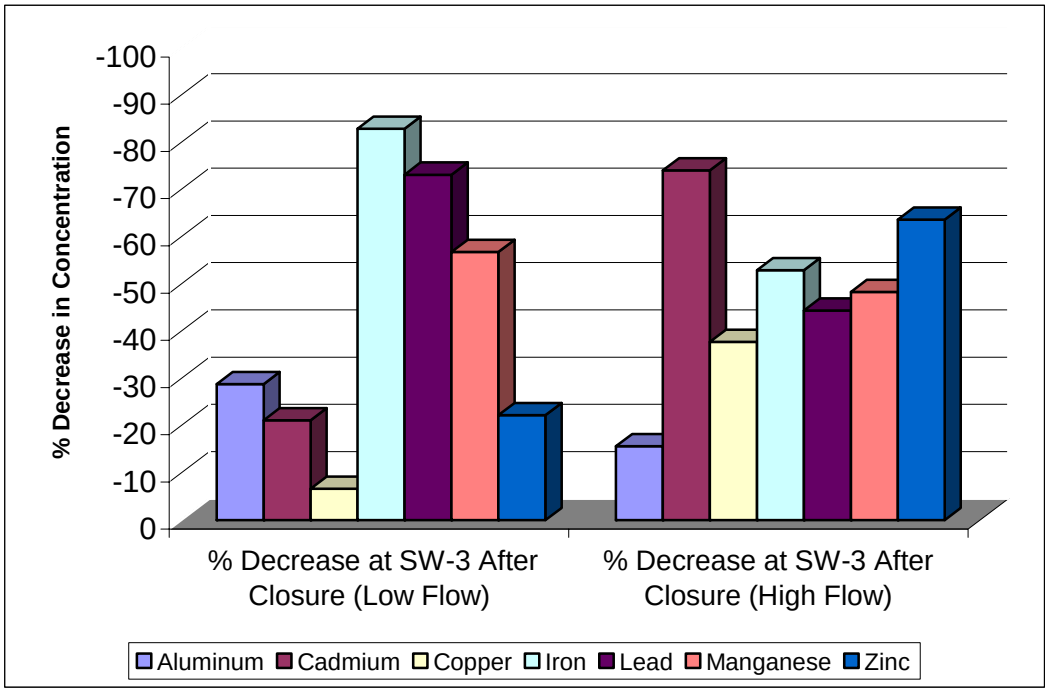


Figure 13 - Concentration and Concentration vs. Flow Graphs for Station SW-3



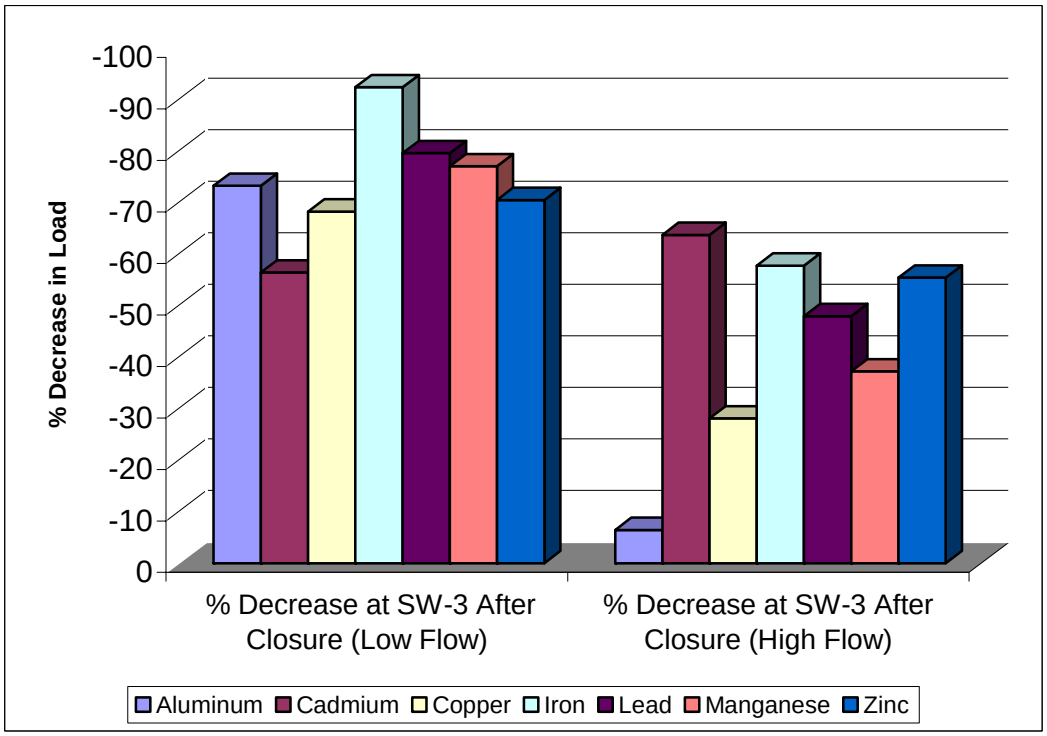


Figure 14. Percent Decrease in Mean Metals Concentrations and Loads at Station SW-3 Compared to Mean Concentrations Measured Prior to Closing the Glengarry Adit

Station FC-4

Station FC-4 is located on Fisher Creek, immediately above the Gold Dust Adit tributary and former road crossing. This station was monitored once during the 2007 field season on September 17th. The last time this station had been monitored was in May 1998 (URS, 1988). Water quality data for this station goes back to October 1989. The pH and SC measured in September 2007 were 4.3 and 141 micromhos/cm, respectively. The range of pH in previous base flow monitoring events (October 1989, April 1992, September 1993, September 1996, and March and April 1998) was between 3.0 and 3.9 s.u.. The range of SC for these base flow monitoring events was 243 to 1,273 micromhos/cm. Trace metals including aluminum, copper, iron, manganese, and zinc measured in September 2007 were lower than the average of each of these metals for the five historical base flow monitoring events. Total recoverable and/or dissolved concentrations of cadmium, copper, and zinc exceeded acute and/or chronic aquatic life standards in the September 2007 monitoring event. Human health guidelines for iron and manganese were also exceeded (**Table A-1**, **Appendix A**).

Station SW-4

At station SW-4, total recoverable and dissolved cadmium concentrations exceeded the chronic aquatic life standard in the April and September monitoring events. Total recoverable and dissolved copper concentrations exceeded the chronic and acute aquatic life standards in all three monitoring events (**Table 6**).

Concentration vs. flow and time graphs for copper, iron, and zinc are presented in **Figure 15** since 1989. These data show that the 2005 through 2007 data (post Glengarry Adit closure monitoring) for copper, iron, and zinc are at the low end of historic concentration data measured at comparable flows. Geochemically, the reach of Fisher Creek between station SW-3 and SW-4 changes considerably with a rise in pH (toward the near-neutral range) that allows metals to precipitate in the stream. The increase in pH with metals precipitation is one reason for the order of magnitude reduction in aluminum, copper, iron, and manganese concentrations measured at this station.

Station CFY-2

At station CFY-2, total recoverable copper concentrations exceeded the chronic and acute aquatic life standards in the June and September monitoring events. Dissolved copper concentrations also exceeded the chronic and acute aquatic life standards in the June monitoring event (**Table 6**). Geochemically, the reach of Fisher Creek between station SW-4 and station CFY-2 changes with an increase in pH and lower metals concentrations.

Concentration vs. flow and time graphs for copper, iron, and zinc are presented in **Figure 16** since 1989. These data show that the 2005 through 2007 data (post Glengarry Adit closure monitoring) for copper, iron, and zinc are within normal historic ranges at comparable flows. Concentrations range widely with flow, with higher concentrations of copper and iron associated with higher flows. The 2007 data, however, continues to substantiate that zinc concentrations are independent of flow conditions.

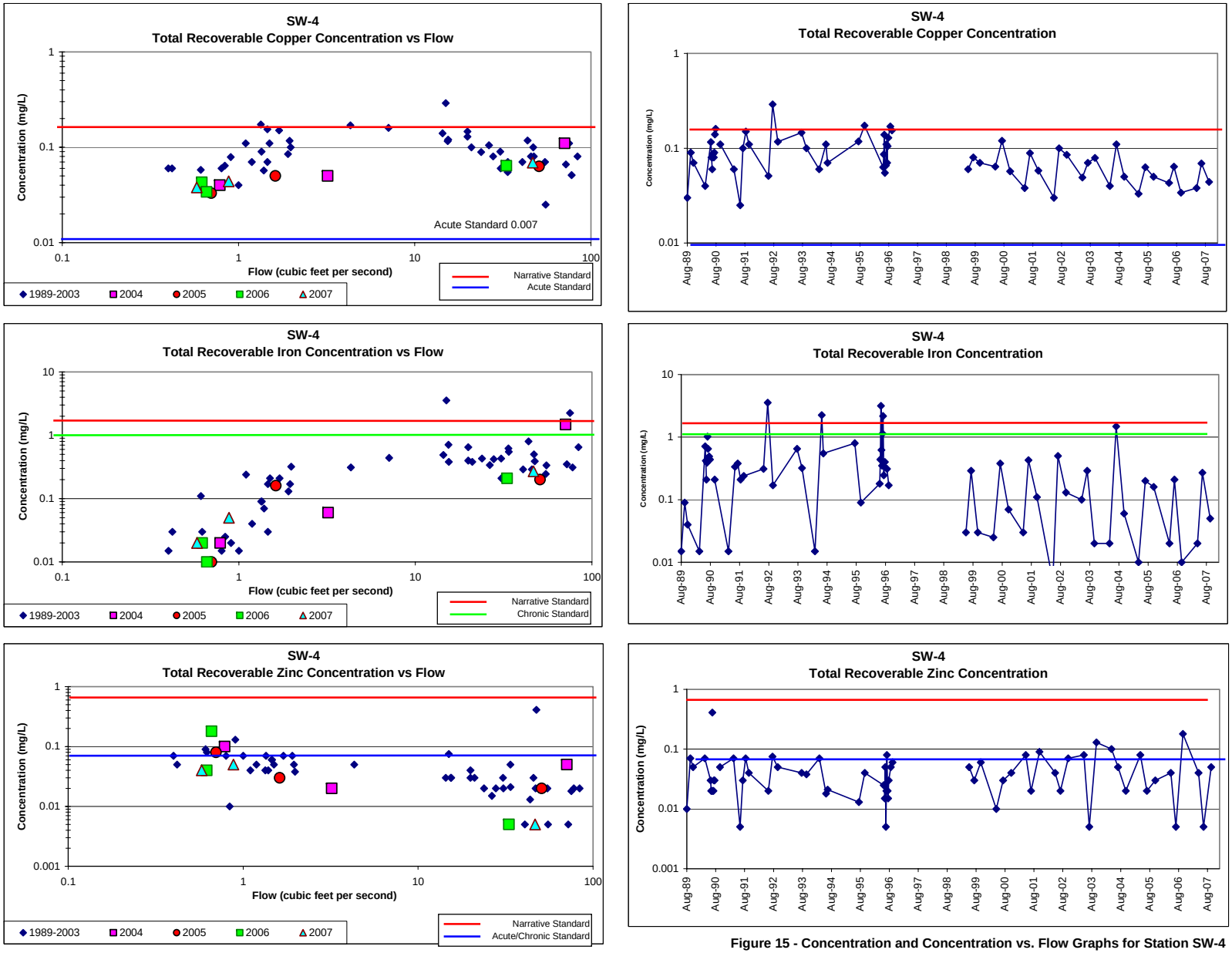
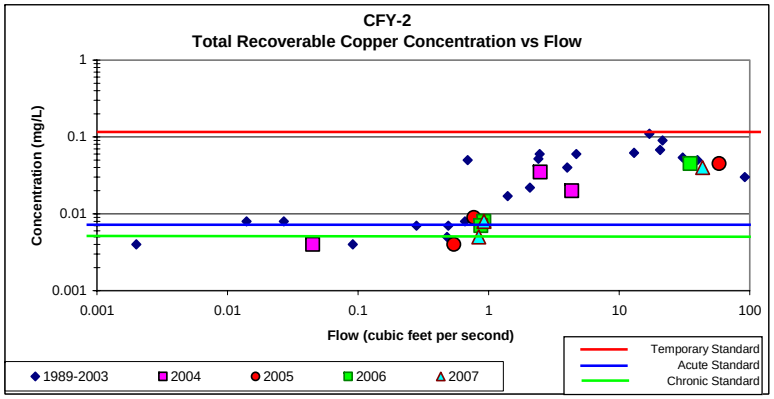
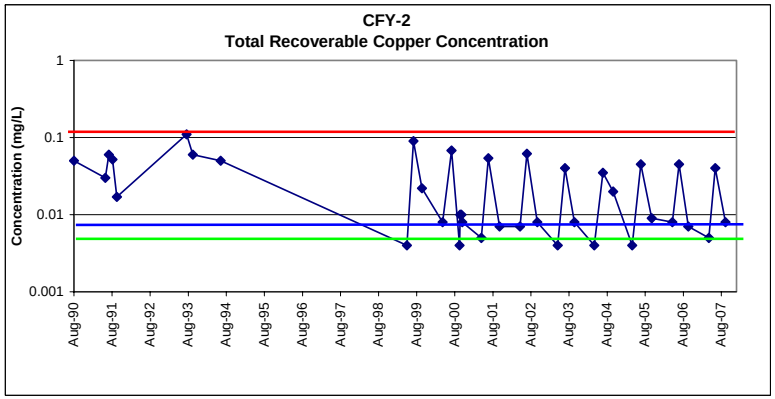
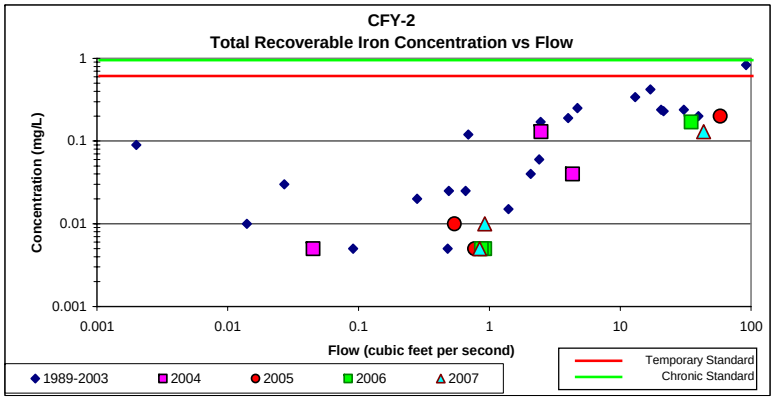
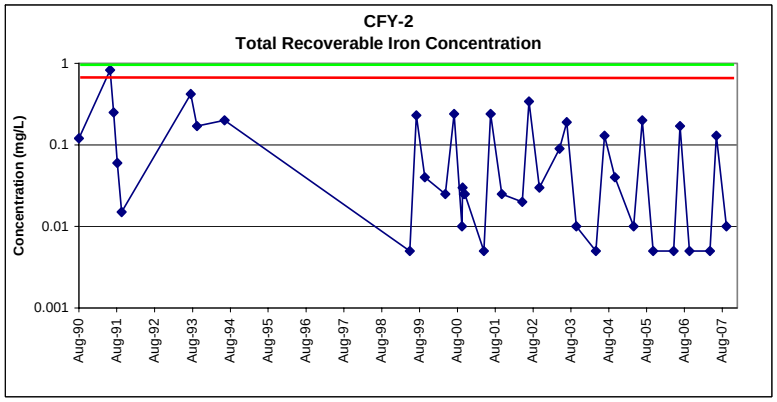


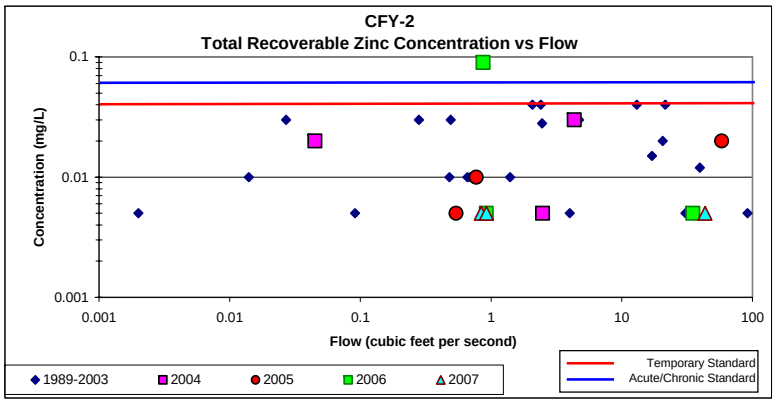
Figure 15 - Concentration and Concentration vs. Flow Graphs for Station SW-4











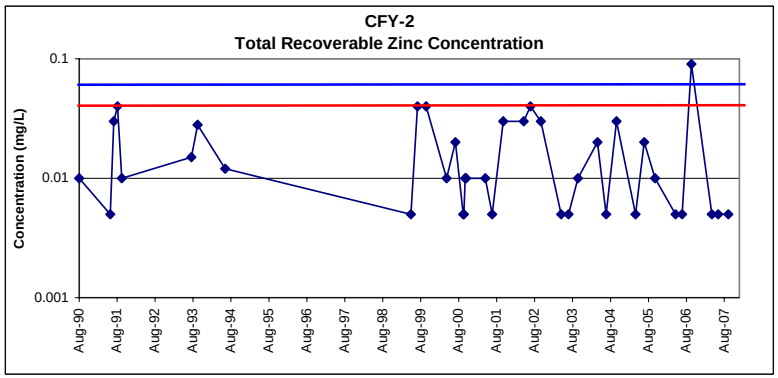


Figure 16 - Concentration and Concentration vs. Flow Graphs for Station CFY-2

Station SW-6

At station SW-6, on the Clarks Fork of the Yellowstone River, pH was similar to station CFY-2 although metals concentrations measured were lower than station CFY-2. Total recoverable and dissolved copper concentrations exceeded the chronic and acute aquatic life standards in the June monitoring event (**Table 6**).

3.1.3 Discussion of Long-Term Surface Water Quality Data - Miller Creek

Table 7 compares 2007 surface water analytical data with corresponding regulatory standards for the two surface water stations, SW-2 and SW-5, on Miller Creek. As in Table 6, shading and/or color of the concentration values for each monitoring station indicates which regulatory standard was exceeded. Human health standards or guidelines for metals were not exceeded in the 2007 monitoring events and this is consistent with monitoring of these stations in previous years.

At station SW-2, total recoverable and dissolved copper concentrations exceeded acute and chronic aquatic life standards in the April and June monitoring events. Dissolved concentrations of copper were 65% lower than the total recoverable concentrations. **Figure 17** shows concentration vs. flow and time graphs for copper, iron, and zinc at station SW-2 for the period of record. Copper and iron concentrations measured in 2007 appear to be within historic ranges. The zinc concentration has decreased to near or below the detection limit since 2006.

At station SW-5, the total recoverable copper concentration exceeded acute and chronic aquatic life standards in the June monitoring event. The dissolved copper concentration also exceeded the chronic aquatic life standard during the June event. Miller Creek was flowing at this station during all 2007 monitoring events.

3.1.4 Discussion of Long-Term Surface Water Quality Data - Soda Butte Creek

Table 8 compares selected 2006 and 2007 surface water analytical data with corresponding regulatory standards for the four surface water stations on Soda Butte Creek. Monitoring during 2007 was conducted during April, June, and September.

Station SBC-1

Station SBC-1 is on the downstream margin of the McLaren Mill site and McLaren Tailings on the main stem of Soda Butte Creek. No exceedance of applicable standards occurred during any of the three monitoring events at this station.

Station SBC-2

Station SBC-2 is situated downstream of the McLaren Mill site and McLaren Tailings site. Copper concentrations exceeded the chronic aquatic life standard in the June monitoring event and iron concentrations exceeded the chronic aquatic life standard in the April and September monitoring events. The human health guideline for iron was also exceeded at this station in April and September.

Results of the 2006 and 2007 monitoring of station SBC-2 have indicated water quality improvements in comparison with 2005 and earlier monitoring results. A decrease in metal concentrations and load in Soda Butte Creek at station SBC-2 has been attributed to removal of the McLaren Mill site waste on NFS land, along Soda Butte Creek, during 2005. Additional details of this analysis are provided in a Technical Memorandum, McLaren Mill Site Water Quality Monitoring Results (Tetra Tech 2008).

TABLE 7

MILLER CREEK SURFACE WATER RESULTS COMPARISON TO STANDARDS
2007 MONITORING EVENTS
New World Mining District Response and Restoration Project

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SW-2 (Total Recoverable)			SW-2 (Dissolved)		
				Apr-07	Jun-07	Sep-07	Apr-07	Jun-07	Sep-07
Aluminum(1)	0.75	0.087	NA	<0.05	0.11	<0.05	<0.05	<0.05	<0.05
Cadmium	0.001054(2)	0.000162(2)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0073(2)	0.00516(2)	1.3	0.008	0.017	0.004	0.007	0.006	0.002
Iron	NA	1	0.3	0.05	0.20	0.06	<0.01	<0.01	0.02
Lead	0.0338(2)	0.0013(2)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	0.004	<0.003	<0.003	0.003	<0.003	<0.003
Zinc	0.067(2)	0.067(2)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	94	60	110			
pH (s.u.)	NA	NA	NA	7.8	7.9	8.0			
Flow (cfs)	NA	NA	NA	0.68	26.1	0.63			

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SW-5 (Total Recoverable)			SW-5 (Dissolved)		
				Apr-07	Jun-07	Sep-07	Apr-07	Jun-07	Sep-07
Aluminum(1)	0.75	0.087	NA	<0.05	0.07	<0.05	<0.05	<0.05	<0.05
Cadmium	0.001054(2)	0.000162(2)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0073(2)	0.00516(2)	1.3	0.004	0.013	0.002	0.003	0.006	0.001
Iron	NA	1	0.3	0.05	0.08	<0.01	<0.01	<0.01	<0.01
Lead	0.0338(2)	0.0013(2)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Zinc	0.067(2)	0.067(2)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	100	60	110			
pH (s.u.)	NA	NA	NA	8.0	8.1	8.3			
Flow (cfs)	NA	NA	NA	0.002	- -	0.070			

NOTES: Shading/coloring indicates exceedance of respectively shaded/colored regulatory standard
Metal parameter values are reported in total recoverable and dissolved concentrations
mg/l = milligrams per liter; s.u. = standard units; cfs = cubic feet per second
-- - No measurement or analysis conducted; NA = not applicable
< - Indicates analyte not detected above laboratory Practical Quantitation Limit (PQL)
NA - Not applicable
NS - No sample collected
(1) - Aluminm standard applies to dissolved concentrations in water with a pH between 6.6 to 9.0 s.u.
(2) - Based on 50 mg/l hardness
pH - Lab pH used in April, June, and September 2007 measurements

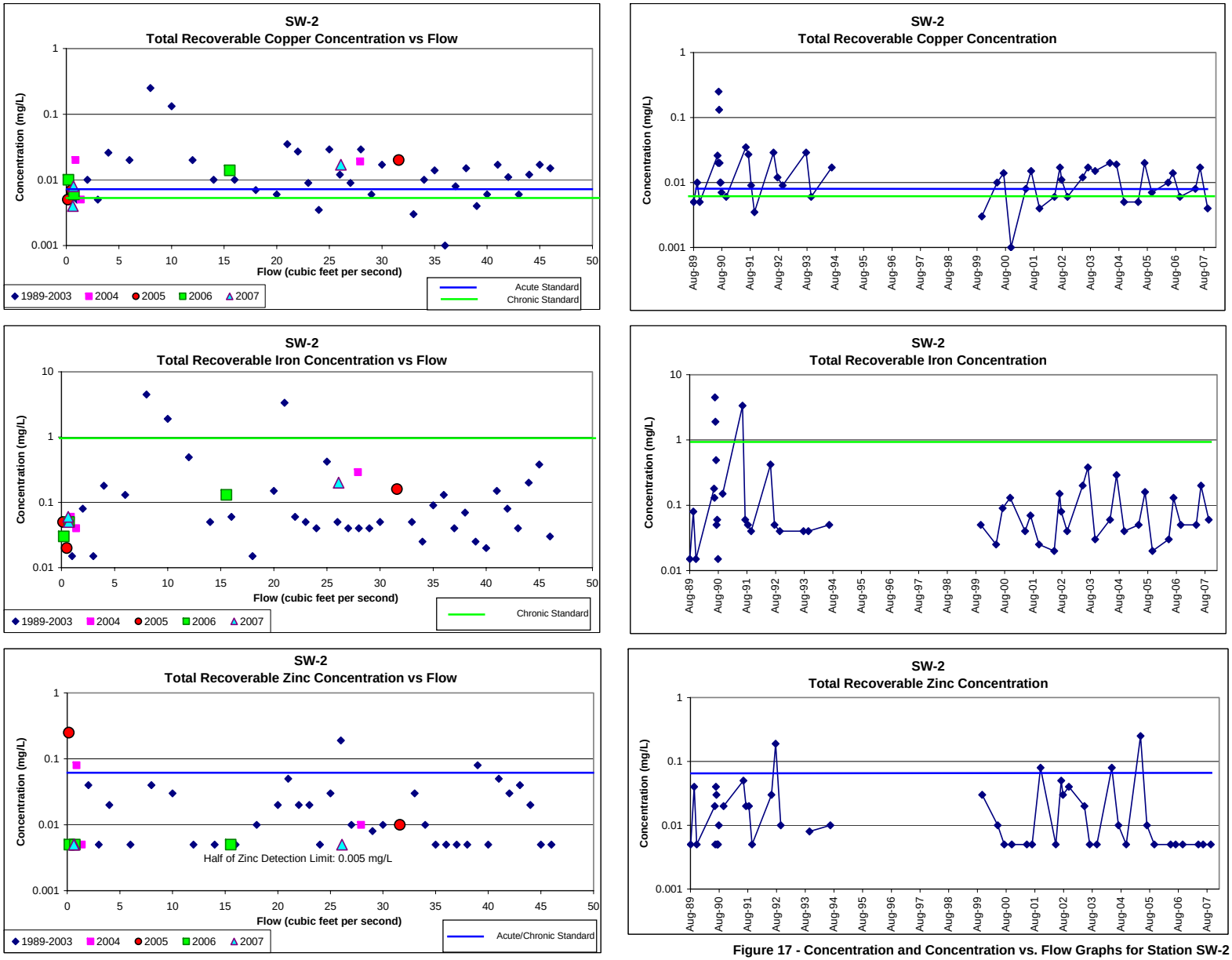


Figure 17 - Concentration and Concentration vs. Flow Graphs for Station SW-2

TABLE 8
SODA BUTTE CREEK SURFACE WATER RESULTS COMPARISON TO STANDARDS
2007 AND 2006 MONITORING EVENTS
New World Mining District Response and Restoration Project

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SBC-1 Apr-07	SBC-1 Jun-07	SBC-1 Sep-07	SBC-1 Apr-06	SBC-1 Jun-06	SBC-1 Sep-06
Aluminum(1)	0.75	0.087	NA	<0.05	<0.05	0.09	0.06	<0.05	<0.05
Cadmium	0.00213(2)	0.00027(2)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0140(2)	0.0093(2)	1.3	<0.001	0.001	0.001	0.002	0.001	<0.001
Iron	NA	1	0.3	<0.01	0.09	0.16	0.17	0.12	0.01
Lead	0.082(2)	0.0032(2)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	<0.003	<0.003	0.003	<0.003	0.006	<0.003
Zinc	0.1198(2)	0.1198(2)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	148	107	136	158	132	134
pH (s.u.)	NA	NA	NA	8.5	8.3	8.5	7.5	7.2	8.1
Flow (cfs)	NA	NA	NA	1.08	10.60	0.85	1.77	8.55	0.66

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SBC-2 Apr-07	SBC-2 Jun-07	SBC-2 Sep-07	SBC-2 Apr-06	SBC-2 Jun-06	SBC-2 Sep-06
Aluminum(1)	0.75	0.087	NA	<0.05	0.09	<0.05	<0.05	<0.05	<0.05
Cadmium	0.00213(2)	0.00027(2)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0140(2)	0.0093(2)	1.3	0.001	0.010	<0.001	0.002	0.008	<0.001
Iron	NA	1	0.3	1.57	0.23	1.17	1.92	0.25	1.24
Lead	0.082(2)	0.0032(2)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	0.037	<0.003	0.028	0.049	0.012	0.029
Zinc	0.1198(2)	0.1198(2)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	162	86	153	179	91	153
pH (s.u.)	NA	NA	NA	8.0	8.0	8.2	7.6	7.1	7.0
Flow (cfs)	NA	NA	NA	1.40	34.70	1.13	1.86	31.17	1.21

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SBSW-102 Apr-07	SBSW-102 Jun-07	SBSW-102 Sep-07	SBSW-102 Apr-06	SBSW-102 Jun-06	SBSW-102 Sep-06
Aluminum(1)	0.75	0.087	NA	0.14	0.29	0.51	0.15	0.43	0.68
Cadmium	0.001054(3)	0.000162(3)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0073(3)	0.00516(3)	1.3	0.002	0.006	0.002	<0.001	0.004	<0.001
Iron	NA	1	0.3	0.33	0.45	1.24	0.35	0.68	1.66
Lead	0.0338(3)	0.0013(3)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	0.004	<0.003	0.010	<0.003	0.012	0.012
Zinc	0.067(3)	0.067(3)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	65	57	75	68	39	67
pH (s.u.)	NA	NA	NA	8.2	8.0	8.4	7.9	6.9	7.3
Flow (cfs)	NA	NA	NA	2.73	- -	3.85	3.14	145.44	3.86

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SBC-4 Apr-07	SBC-4 Jun-07	SBC-4 Sep-07	SBC-4 Apr-06	SBC-4 Jun-06	SBC-4 Sep-06
Aluminum(1)	0.75	0.087	NA	0.05	0.56	0.32	0.48	0.57	0.49
Cadmium	0.001054(3)	0.000162(3)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0073(3)	0.00516(3)	1.3	<0.001	0.003	<0.001	<0.001	0.002	<0.001
Iron	NA	1	0.3	0.13	0.67	0.66	0.52	0.90	1.16
Lead	0.0338(3)	0.0013(3)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	0.003	0.004	0.006	0.006	0.017	0.008
Zinc	0.067(3)	0.067(3)	2	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	113	42	96	106	43	81
pH (s.u.)	NA	NA	NA	8.1	8.0	8.6	8.0	6.6	6.3
Flow (cfs)	NA	NA	NA	6.30	- -	9.62	16.77	- -	10.24

NOTES: Shading/coloring indicates exceedance of respectively shaded/colored regulatory standard
Metal parameter values are in total recoverable concentrations
mg/l = milligrams per liter; s.u. = standard units; cfs = cubic feet per second
-- - No measurement or analysis conducted; NA = not applicable
< - Indicates analyte not detected above laboratory Practical Quantitation Limit (PQL)
(1) - Aluminm standard applies to dissolved concentrations in water with a pH between 6.6 to 9.0 s.u.
(2) - Based on 100 mg/l hardness - Stations SBC-1 and SBC-2
(3) - Based on 50 mg/l hardness - Stations SBSW-102 and SBC-4
pH - Lab pH used in April, June, and September 2007 measurements

Station SBSW-102

Station SBSW-102 is located below the mouth of Woody Creek near the Great Republic Smelter site. Copper concentrations exceeded the chronic aquatic life standard in June and iron concentrations exceeded the chronic aquatic life standard in September. The human health guideline for iron was also exceeded at this station in all 2007 monitoring events. Station SBC-4 is located at the Yellowstone National Park boundary. Iron concentrations exceeded the human health guideline at both stations in all 2007 monitoring

At station SBC-1, 2007 concentrations of aluminum, copper and iron were lower or generally unchanged during April and June and higher in September compared with 2006 monitoring results. Stations SBC-2 and SBSW-102 2007 concentrations of aluminum, copper, iron, lead, and manganese were similar to 2006 monitoring results. At station SBC-4, 2007 concentrations of aluminum, copper, lead, and manganese were similar and iron was lower in comparison with 2006 monitoring results (**Table 8**). Removal of mine waste from a portion of the McLaren Mill Site, and removal of slag and soil containing elevated metals from the Great Republic Smelter in 2005 may have contributed to improvement of water quality as measured at these Soda Butte Creek monitoring stations. Continuing detection of metals in Soda Butte Creek at these stations may also originate from other sources that remain in the watershed including the remaining McLaren Tailings and mine waste sites located in the Woody Creek and Republic Creek drainages.

Stations SBT-3 and SBT-6

Table 9 compares 2007 surface water analytical data with corresponding regulatory standards for stations SBT-3 and SBT-6, which lie along a tributary to Soda Butte Creek that drains the repository area (**Figure 2**). As in **Table 8**, shading and/or color of the concentration values for each monitoring station indicates which regulatory standard was exceeded.

Concentrations of aluminum, iron, lead, and manganese were detected in at least one of the three monitoring events (April, May, and/or September 2007). However, no exceedance of applicable standards occurred during any of these monitoring events at these stations. The relative decrease in metal concentrations compared with the 2005 and 2006 monitoring results may be attributed to completion of capping the repository facility in 2006.

TABLE 9
TRIBUTARY TO SODA BUTTE CREEK SURFACE WATER RESULTS COMPARISON TO STANDARDS
2007 MONITORING EVENTS
New World Mining District Response and Restoration Project

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SBT-3 (Total Recoverable)			SBT-3 (Dissolved)		
				Apr-07	May-07	Sep-07	Apr-07	May-07	Sep-07
Aluminum(1)	0.75	0.087	NA	<0.05	0.27	<0.05	<0.05	<0.05	<0.05
Cadmium	0.00213(2)	0.00027(2)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0140(2)	0.0093(2)	1.3	0.001	0.004	<0.001	<0.001	0.001	<0.001
Iron	NA	1	0.3	<0.01	0.29	0.02	<0.01	<0.01	<0.01
Lead	0.082(2)	0.0032(2)	0.015	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	<0.003	<0.005	<0.003	<0.003	<0.003	<0.003
Zinc	0.1198(2)	0.1198(2)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	124	46	159			
pH (s.u.)	NA	NA	NA	8.0	7.7	8.1			
Flow (cfs)	NA	NA	NA	0.19	5.09	0.0040			

Parameter (mg/l)	Aquatic Life (acute)	Aquatic Life (chronic)	Human Health Standard (Iron & Manganese values are guidelines)	SBT-6 (Total Recoverable)			SBT-6 (Dissolved)		
				Apr-07	May-07	Sep-07	Apr-07	May-07	Sep-07
Aluminum(1)	0.75	0.087	NA	<0.05	0.20	<0.05	0.06	<0.05	<0.05
Cadmium	0.00213(2)	0.00027(2)	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	0.0140(2)	0.0093(2)	1.3	0.002	0.004	<0.001	0.001	0.002	<0.001
Iron	NA	1	0.3	0.02	0.29	0.03	<0.01	0.02	<0.01
Lead	0.082(2)	0.0032(2)	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	NA	NA	0.05	0.004	<0.005	0.006	0.003	<0.003	0.004
Zinc	0.1198(2)	0.1198(2)	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NA	NA	NA	120	51	160			
pH (s.u.)	NA	NA	NA	8.1	8.0	8.2			
Flow (cfs)	NA	NA	NA	0.272	14.20	0.0266			

NOTES: Shading/coloring indicates exceedance of respectively shaded/colored regulatory standard
All metals are reported as Total Recoverable Metals
mg/l = milligrams per liter; s.u. = standard units; cfs = cubic feet per second
-- - No measurement or analysis conducted; NA = not applicable
< - Indicates analyte not detected above laboratory Practical Quantitation Limit (PQL)
J - Indicates value is estimated
(1) - Aluminm standard applies to dissolved concentrations in water with a pH between 6.6 to 9.0 s.u.
(2) - Based on 100 mg/l hardness
pH - Lab pH used in April, May, and September 2007 measurements

3.1.5 Discussion of Adit Discharge Monitoring

Eleven adit discharges were monitored in the District during 2007 (**Figure 4** and **Table 2**). Of these, the Glengarry adit discharge is included here, although it was monitored as part of surface water monitoring program during June 2007. The remaining ten adit discharge sites were considered to be perennial flow with water quality exceeding Montana water quality standards or guidelines. These sites were monitored in August and September to characterize discharge during low (base) flow conditions. Monitoring results including field data are summarized in **Table 10**. Laboratory analytical results for samples are summarized in **Table A-1** (**Appendix A-1**).

Glengarry Adit

The Glengarry adit discharge (F-8A) was monitored below the reclaimed portal in June 2007. The significantly decreased adit discharge was identified as seepage in the reclaimed waste rock footprint about 70 feet below the closed portal. Adit discharge was visually estimated at less than two gpm. The June 2007 monitoring event was the second event conducted at this site since closure of the Glengarry Adit in September 2004. Post closure parameters are summarized in **Table 11**, and compared with average parameters values from monitoring events conducted between 1989 and 2000.

Adit closure resulted in a reduction of adit discharge by 98% and a significant improvement in the water quality of the discharge. The pH of the discharge was 6.9 standard units (s.u.) in June 2007 and remains substantially higher than the pH measured prior to closure of the Glengarry Adit. Sulfate concentration has decreased by 73% and metals by a minimum of 75% in the discharge. In terms of metal loads, a reduction of 99% or more was achieved with closure of the adit (**Table 11**).

Glengarry Mill Site Adit

The Glengarry Mill Site adit (F-8B) discharge (F-8A) was monitored at the portal in August and September 2007. Adit discharge was 1.12 gpm in August and 1.75 gpm in September. The pH of the discharge was 3.4 s.u.

Concentrations of copper, iron, manganese, and zinc exceeded acute and/or chronic aquatic standards in the August and September monitoring events. Concentrations of cadmium and lead exceeded the chronic aquatic standard in August. Human health guidelines for iron and manganese were exceeded in the August and September (**Table 10**).

Gold Dust Adit

The Gold Dust Adit discharge (F-28) was monitored in June, August, and September 2007. Measured adit discharge was 24.24 gpm (0.054 cfs) in June decreasing to 3.88 gpm (0.009 cfs) in September. The higher flows measured during June are from snowmelt into the first 100 feet or so of the former workings through the back (roof) of the drift.

The human health guideline for iron was exceeded in the June and August monitoring events. The human health guideline for manganese was exceeded in the August and September monitoring events. All other trace metals were below human health guidelines and aquatic life standards (**Table 10**).

TABLE 10
2007 MINE ADIT DISCHARGE MONITORING AND FIELD PARAMETER DATA
New World Mining District Response and Restoration Project

Site Number	Site Name	Sample Date	Flow (gpm)	pH Fld (su)	pH Lab (su)	SC (uS/cm)	Temp (^{0}C)	Hard-ness	Total Recoverable Concentration - milligrams per liter													
									Aluminum(1)		Cadmium		Copper		Iron		Lead		Manganese		Zinc	
Human Health Standard or Guideline (Iron and Manganese)									NA		0.005		1.3		0.300		0.015		0.050		2.0	
Acute Aquatic Standard (where applicable, calculated for hardness = 50/250*)									0.750		0.00105/0.0054		0.0073/0.0332		NA		0.0338/0.262		--		0.067/0.260	
Chronic Aquatic Standard (where applicable, calculated for hardness = 50/250*)									0.087		0.00016/0.00053		0.0052/0.0204		1.0		0.0013/0.0102		--		0.067/0.260	
									TRC	Dissolved	TRC	Dissolved	TRC	Dissolved	TRC	Dissolved	TRC	Dissolved	TRC	Dissolved	TRC	Dissolved
F-8A	Glengarry Adit	6/12/2007	<2(2)	6.9	7	243	2.0	131	1.01		0.0003		0.39		23.6		0.005		0.63		0.09	
RR-F-8B	Glengarry Millsite Adit	8/20/2007	1.120	3.4	3.4	357	5.8	44	0.31	0.19	0.0002	0.0001	0.097	0.072	41	8.63	0.002	<0.001	1.13	1.05	0.13	0.12
		9/17/2007	1.750	3.4	3.5	728	5.2	44	0.19	0.22	0.0001	0.0001	0.07	0.065	7.46	7.28	<0.001	<0.001	1.1	1.09	0.11	0.12
RR-F-28	Gold Dust Adit	6/12/2007	24.235	6.6	7.3	303	2.2	64	<0.05		<0.0001		0.002		0.45		<0.001		0.03		<0.01	
		8/20/2007	4.550	7.1	7.7	884	5.3	388	0.08	<0.05	<0.0001	<0.0001	0.003	<0.001	0.42	0.06	0.002	<0.001	0.093	0.082	0.02	<0.01
		9/17/2007	3.880	7.1	7.5	854	3.2	411	<0.05	<0.05	<0.0001	<0.0001	0.002	<0.001	0.22	0.06	<0.001	<0.001	0.079	0.087	<0.01	0.01
RR-FCSI-96-5	Lower Tredennic Dump 1	8/20/2007	1.810	6.7	7.1	238	4.4	99	0.29	<0.05	0.0003	0.0001	0.008	0.001	0.62	<0.01	0.003	<0.001	0.27	0.09	0.06	0.03
		9/17/2007	0.260	6.7	7.1	221	4.6	99	0.16	0.12	0.0002	<0.0001	0.005	<0.001	0.43	<0.01	0.003	<0.001	0.2	0.089	0.04	0.02
RR-FCSI-99-1	Sheep Mountain #1 (NDP)	8/20/2007	0.054	7.3	8.3	322	13.0	151	1.36	<0.05	0.0014	<0.0001	0.21	0.002	7.15	<0.01	0.3	<0.001	0.29	<0.003	0.22	<0.01
		9/17/2007	0.003	7.3	7.9	562	4.9	187	0.11	<0.05	0.0002	0.0001	0.013	0.001	0.43	<0.01	0.009	<0.001	0.026	<0.003	0.04	0.04
RR-AE-17	Henderson Mountain Dump 7	8/20/2007	dry																			
		9/18/2007	dry																			
RR-D-18	McLaren Adit	8/20/2007	4.600	6.3	6.3	1035	6.1	424	0.7	<0.05	<0.0001	<0.0001	0.044	0.002	34	25.3	0.004	<0.001	1.24	1.09	0.09	0.07
		9/18/2007	4.800	6.3	6.5	9.15	3.8	436	0.17	<0.05	<0.0001	<0.0001	0.02	0.002	29.3	23.1	<0.001	<0.001	1.13	1.14	0.08	0.07
RR-M-1	Little Daisy Adit	8/20/2007	6.350	7.4	6.8	1232	6.2	633	0.33	<0.05	0.0004	0.0003	0.051	<0.001	13.4	10.8	0.15	<0.001	2.42	2.21	0.18	0.13
		9/18/2007	5.520	7.4	7.6	1102	2.7	624	<0.05	<0.05	0.0001	0.0001	0.004	0.002	3.53	3.02	0.001	<0.001	1.52	1.54	0.06	0.07
RR-M-8	Black Warrior Adit	8/20/2007	0.110	7.1	7.8	450	6.8	170	16.3	<0.05	0.0047	0.0015	0.041	<0.001	19.8	<0.01	0.2	<0.001	0.54	<0.003	1.21	0.33
		9/18/2007	<0.25(2)	7.1	8.3	376	4.8	201	57.9	<0.05	0.011	0.0004	0.16	<0.001	83.5	<0.01	1.36	<0.001	2.06	<0.003	2.96	0.07
RR-MCSI-96-3	Upper Miller Creek Dump (NDP)	8/20/2007	0.052	5.9	6.9	301	6.8	90	10.4	<0.05	0.0046	0.0007	0.03	<0.001	19.1	<0.01	0.61	<0.001	0.88	<0.003	0.96	0.22
		9/18/2007	<0.25(2)	5.9	6.9	228	4.5	99	9.5	<0.05	0.0093	0.0007	0.03	<0.001	16.4	<0.01	0.36	<0.001	3.64	<0.003	1.48	0.26
RR-M-25	Henderson Mountain Adit	8/20/2007	0.002	7.05	7.1	177	6.5	54	0.15	<0.05	0.0013	0.0012	0.46	0.33	0.34	<0.01	0.051	0.007	0.024	0.018	0.17	0.14
		9/18/2007	dry																			

Notes: Shading/coloring indicates exceedance of respective standard
SC = specific conductance in microsiemens per centimeter (us/cm)
gpm = gallons per minute
su = standard units
NDP = Non-District Property
TRC = Total Recoverable Concentration

< = less than the practical quantitation limit
* = Hardness and Metal concentrations in milligrams per lit are calculated on the basis of hardness values
Fld = Fld: Measurement conducted in field
Lab = Lab: Measurement conducted in laboratory
(1) = Aluminum standard applies to dissolved concentrations in water with a pH between 6.6 and 9.0 s.u.
(2) = Visual estimation of flow

TABLE 11
GLENGARRY WATER QUALITY COMPARISON
– PRE AND POST CLOSURE
New World Mining District Response and Restoration Project

Parameter	Measured Value[1] [2]					
	Pre-Adit Closure Avg 1989 - 2000	Post-Adit Closure 10/11/2005	Post-Adit Closure 6/28/2006	Post-Adit Closure 6/12/2007	Post-Adit Closure Avg 2006 - 2007	% Reduction
Flow (gpm)	58.9	2.2	0.5	2	1.25	97.9
pH (s.u.)	range 2.6 - 3.2	5.6	6.4	6.9	- -	--
Sulfate	430	199	138	96	117.00	72.8
Aluminum	9.09	0.43	0.07	1.01	0.54	94.1
Cadmium	0.002	0.0004	0.0001	0.0003	0.00	87.3
Copper	2.8	0.3	0.038	0.39	0.21	92.3
Iron	52.3	8.16	2.32	23.6	12.96	75.2
Lead	0.022	0.005	0.001	0.005	0.00	86.6
Manganese	4.14	0.59	0.29	0.63	0.46	88.9
Zinc	0.41	0.11	0.03	0.09	0.06	85.4
Average Metals Reduction (%)						**85.3**
	Load (kilograms/day) [2]					
	Pre-Adit Closure Avg 1989 - 2000	Post-Adit Closure 10/11/2005	Post-Adit Closure 6/28/2006	Post-Adit Closure 6/12/2007	Post-Adit Closure Avg 2006 - 2007	% Reduction
Flow (gpm)	--	--	--	--	--	--
pH (s.u.)	--	--	--	--	--	--
Sulfate	136	2.38	0.38	1.05	0.96	99.3
Aluminum	2.88	0.005	0.00019	0.011	0.004	99.8
Cadmium	0.018	0.000005	0.0000003	0.0000032	0.0000	99.9
Copper	0.68	0.004	0.0001	0.0043	0.0001	100.0
Iron	0.08	0.098	0.0063	0.26	0.0000	100.0
Lead	0.001	0.0001	0.000003	0.000055	0.0000	100.0
Manganese	0.03	0.01	0.0008	0.007	0.0000	100.0
Zinc	0.00005	0.0013	0.00008	0.00097	0.0000	100.0
Average Reduction (%)						**99.9**

Notes: Flow on 6/12/07 was estimated Avg - Average
(1) Measured value in total recoverable concentration in milligrams per liter unless noted otherwise
(2) Adit closure was completed in September 2004
gpm - gallons per minute;
s.u. - standard units;
-- indicates not applicable

Lower Tredennic Dump 1

The Lower Tredennic Dump 1 discharge (FCSI-96-5) was monitored in August and September 2007. Measured adit discharge was 1.81 gpm in August and decreased to 0.26 gpm in September. The concentration of cadmium exceeded the chronic aquatic standard in June. The dissolved concentration of aluminum exceeded the chronic aquatic standard in September.

Human health guidelines for iron and manganese were exceeded in the August and September (**Table 10**).

Sheep Mountain #1 (Non-District Property)

The Sheep Mountain #1 discharge (FCSI-99-1) was monitored in August and September 2007. Measured adit discharge was 0.054 gpm in August and decreased to 0.003 gpm in September. Concentrations of cadmium, copper, iron, lead, and zinc exceeded the chronic and/or acute aquatic standards in June. The lead concentration in September also exceeded the chronic aquatic standard. Human health guidelines for iron and manganese were exceeded in the August. The human health guideline for iron was also exceeded in the September (**Table 10**).

Henderson Mountain Dump 7

The Henderson Mountain Dump 7 discharge (AE-17) was dry during monitoring activities in August and September 2007.

McLaren Adit

The McLaren Adit discharge (D-18) was monitored in August and September 2007. Measured discharge was 4.6 gpm in August and 4.8 gpm in September. The concentration of copper exceeded the chronic aquatic standard in August. The concentration of iron also exceeded the chronic aquatic standard in August and September. Human health guidelines for iron and manganese were exceeded in the August and September (**Table 10**).

Little Daisy Adit

The Little Daisy Adit discharge (M-1) was monitored in August and September 2007. Measured discharge was 6.35 gpm in August and 5.52 gpm in September. The concentrations of copper, iron, and lead exceeded chronic aquatic standards in August. The concentration of iron also exceeded the chronic aquatic standard in September. The human health standard for lead was met in August. Human health guidelines for iron and manganese were exceeded in the August and September (**Table 10**).

Black Warrior Adit

The Black Warrior Adit discharge (M-8) was monitored in August and September 2007. Discharge was measured at 0.11 gpm in August and estimated at less than 0.25 gpm in September. The concentrations of cadmium, copper, iron, lead, and zinc exceeded acute and chronic aquatic standards in August and September. The concentration of iron also exceeded the chronic aquatic standard in September. The human health standard for lead was exceeded in August and September. Human health guidelines for iron and manganese were also exceeded in the August and September (**Table 10**).

Upper Miller Creek Dump (Non-District Property)

The Upper Miller Creek Dump Adit discharge (MCSI-96-3) was monitored in August and September 2007. Discharge was measured at 0.052 gpm in August and estimated at less than

0.25 gpm in September. The concentrations of cadmium, iron, lead, and zinc exceeded acute and/or chronic aquatic standards in August and September. Human health standards for cadmium and lead were exceeded in August and/or September. Human health guidelines for iron and manganese were also exceeded in August and September (**Table 10**).

Henderson Mountain Adit

The Henderson Mountain Adit discharge (M-25) was monitored in August and September 2007. Discharge was measured at 0.002 gpm in August and dry in September. Concentrations of cadmium, copper, lead, and zinc exceeded acute and/or chronic aquatic standards in August. The human health standard for lead was exceeded and the human health guideline for iron was exceeded in August (**Table 10**).

3.2 GROUNDWATER

Groundwater monitoring was conducted during 2007 in monitoring wells located in the McLaren Pit area, the Fisher Creek drainage, and the New World Waste Repository area. Wells monitored in 2007 are listed in **Tables 3 and 4** and well locations are shown on **Figures 5 and 6**. Included in **Appendix B-1** are **Tables B-1 and B-2** that summarize groundwater monitoring data collected in 2007. Supporting documentation for the 2007 groundwater monitoring events is included in **Appendix B-2** (groundwater field forms), **Appendix C** (field notes), and **Appendix D** (laboratory analytical reports and chain of custody forms). The discussion of McLaren Pit area groundwater monitoring is presented in a separate section (Section 3.3).

3.2.1 Fisher Creek Drainage

Field parameter data collected in 2007 from Como Basin monitoring wells MW-1, EPA-11, EPA-12, and FCGW-100 (headwaters of Fisher Creek) are presented in **Table 12**. Several of the wells are completed in various bedrock formations. Well MW-1 is completed and screened in Wolsey Shale, well EPA-11 in a Tertiary Intrusive Dike, EPA-12 in the Scotch Bonnet Diorite of the Fisher Mountain Tertiary Intrusive Complex (URS 1998), and FCGW-100 in the former Glengarry drift (approximately 385 feet below ground surface). Monitoring in July 2007 indicated that the pH of wells in the Como Basin ranged from 4.88 s.u. (MW-1) to 6.38 s.u. (EPA-12). Water levels remain higher in these wells as measured in the 2005 and 2006 monitoring events. Artesian flow persisted in well FCGW-100. Groundwater levels declined in wells EPA-11 and EPA-12 between the July and September monitoring events. Bedrock water levels in the Como Basin follow the seasonal hydrograph, with highest levels coincident with spring runoff and associated high flows in the Fisher Creek drainage.

TABLE 12
2007 FIELD PARAMETER DATA - COMO BASIN MONITORING WELLS
New World Mining District Response and Restoration Project

Well	Date	Depth to Water (feet)	pH (standard units)	SC(1) (micromhos/cm)	T (degrees Celsius)	Dissolved Oxygen(2) (mg/L)	ORP(3) (milli-volts)
FCGW-100	7/19/07	Artesian	5.77	1,466	3.96	1.30	-59.9
	8/20/07(4)	Artesian	5.39	1,475	3.60	0.51	-138.9
	9/25/07	Artesian	5.20	1,459	2.92	0.32	24.2
EPA-11	7/17/07	30.63	5.24	1,740	3.70	0.67	-88.3
	9/25/07(4)	38.75	4.00	1,269	2.56	0.49	48.0
EPA-12	7/17/07	1.12	6.38	510	4.59	1.01	-26.3
	9/25/07(4)	3.55	6.50	446	2.76	0.13	44.2
MW-1	7/23/07	10.07	4.88	823	2.44	0.58	-101.6

Notes: See Appendix B-2 for logs with detailed description of monitoring methods
1) SC (specific conductivity) in micromhos/centimeter
2) Dissolved oxygen in milligrams per liter
3) ORP – oxidation/reduction potential in millivolts
4) Less than one casing volume removed from well prior to monitoring

A comparison of groundwater chemistry in Como Basin monitoring wells including Tracer 5 is presented in **Table 13**. Groundwater in these wells is mineralized with hardness and SC greater than 100 and 400 mg/L, respectively. The exception to this is well Tracer 5 with a hardness of 32 mg/L. Well Tracer 5 is located in a tributary drainage to Fisher Creek, southeast of the Como Basin. The 2007 monitoring data indicates high concentrations of iron, manganese, and zinc in groundwater of the Como Basin in comparison with groundwater sampled from monitoring wells down-basin in the Fisher Creek drainage (wells MW-10A/10B, MW-9A/9B, SB-16, and MW-11). Cation/anion data collected in 2007 and in previous years indicate that groundwater in the Como Basin is predominantly a calcium-magnesium-sulfate type water.

TABLE 13
COMPARISON OF COMO BASIN WELL MONITORING DATA
New World Mining District Response and Restoration Project

Parameter	Well EPA-11 July 2007	Well FCGW-100 July 2007	Well MW-1 July 2007	Well Tracer 5 July 2007	Well EPA-12 July 2007
Completion Formation	Tertiary Intrusive	Glengarry Adit Tertiary	Wolsey Shale	Tertiary Intrusive	Scotch Bonnet Diorite
Total Depth	150	385	115	205	155
Depth to Water (feet)	30.63	Artesian	10.07	5.58	1.12
pH (s.u.)	5.4	5.8	4.4	4.6	5.8
SC (umhos/cm)	1,510	1,466	943	633	467
TDS	1,580	1,500	801	725	347
Hardness (CaCO3)	599	438	323	32	146
Calcium	151	131	80	8	37
Magnesium	54	27	30	3	13
Sodium	3	5	4	5	5
Potassium	4	7	3	3	2
CaCO3 Alkalinity	<1	<1	<1	<1	<1
HCO3 Alkalinity	<1	<1	<1	<1	<1
Sulfate	995	928	412	346	170
Chloride	<1	1	2	<1	<1
Aluminum	0.67	0.5	0.32	31.7	<0.05
Cadmium	0.0019	<0.0001	0.0002	0.0026	<0.0001
Copper	<0.001	0.004	0.01	0.62	<0.001
Iron	208	273	70.4	76.6	37.1
Lead	0.022	<0.001	0.002	0.006	<0.001
Manganese	8.59	9.18	4.32	1.36	2.04
Zinc	0.65	0.1	0.11	0.35	0.06

Notes: s.u. : Standard Units
Cation, anion, and metal concentrations are dissolved
Concentrations in milligrams per liter unless otherwise indicated
Well Tracer 5 is seasonally artesian and was not under artesian conditions during monitoring in July 2007

During July 2007, monitoring was also conducted in wells MW-10A/10B, MW-9A/9B, SB-16, and MW-11 (**Table B-1, Appendix B**). Downstream of the Glengarry Adit, groundwater tends to be less mineralized. Wells MW-9B and MW-10B screened in shallow bedrock exhibited artesian conditions in July 2007 as in previous events. Monitoring of well pairs MW-9A/9B and MW-10A/10B (**Figure 3**) indicated an upward hydraulic gradient in July 2007 as with previous monitoring events. The 2007 monitoring indicated that water in wells MW-9B and MW-10B is calcium-sulfate type water.

Concentrations of iron and manganese in groundwater at well MW-9B were above the human health guidelines but an order of magnitude lower than concentrations measured in the Como Basin wells. Well MW-9A exhibits very similar chemistry but with the detection of aluminum, cadmium, and copper. Sulfate and hardness were less than 50 mg/L.

Wells SB-16 and MW-11 are both completed in Precambrian granite. Well SB-16 is located upstream of the MW-10 well pair and well MW-11 is located the farthest downstream of the wells monitored. Groundwater in wells SB-16 and MW-11 is similar and is calcium-sulfate-bicarbonate water. Monitoring of well SB-16 in 2007 indicated less mineralization, sulfate, iron, and manganese concentrations compared with well MW-10B. Monitoring of well MW-11 in 2007 indicated that it was only slightly mineralized (hardness 14 mg/L, total dissolved solids 38 mg/L), with copper and iron detected near the PQL.

3.2.2 New World Waste Repository

Six wells at three paired-well locations were monitored at the New World Waste Repository site in 2007. Each well pair consists of a well completed in glacial *till* material (well has a "T" designation) and a deeper well completed in Precambrian granite bedrock. These wells were monitored twice with one monitoring event conducted in May and the other conducted in June. Depth to groundwater levels were also measured on a daily schedule in *till* wells SBGW-105T and -107T using continuous water level monitoring devices (data loggers). **Figures 18 and 19** show water level changes in the two wells since the water level monitors were installed in October 2003. **Figure 20** shows the shallow *till* groundwater elevation and flow direction measured at the repository site. **Table 14** summarizes field parameter measurements and analytical results for monitoring wells and compares 2007 water quality data with 2006 and 2005 data.

The 2007 monitoring data indicated a downward hydraulic gradient in the vicinity of the SBGW-105 well pair (the *till* well has a shallower depth to water/groundwater elevation than the bedrock well, **Table 14**). A downward gradient was also documented at this location in 2006. Upward hydraulic gradients were documented at the SBGW-105 well pair location previous to 2006. The change in gradient direction could be attributed to excavation and removal of *till* material between well pairs SBGW-105 and SBGW-108 as part of construction of the repository cap. The 2007 monitoring of groundwater in the SBGW-107 well pair exhibited a downward hydraulic gradient. The SBGW-108 well pair exhibited a downward hydraulic gradient, although less pronounced in comparison with SBGW-107. Downward hydraulic gradients measured in 2007 in the SBGW-107 and SBGW-108 well pairs are consistent with monitoring in previous years.

Continuous water level monitoring in wells SBGW-105T and SBGW-107T indicated that groundwater levels increased coincident with the melting of the accumulated snow pack in the repository area. Melting of the snow pack started on about March 12, 2007, based on flow data from the USGS real-time monitoring site on Soda Butte Creek at the Yellowstone Park Boundary at Silver Gate (USGS Station 06187915; project station SBC-4). Water levels in both wells began rising within eight days after this date, with peak levels reached on April 30, 2007. By middle of July, water levels in both wells had dropped nearly too pre-snowmelt period levels. Well SBGW-107T was dry by July 16 and remained dry through the end of the 2007 field season. Water levels in till well SBGW-105T continued to decline through August and September 2007.

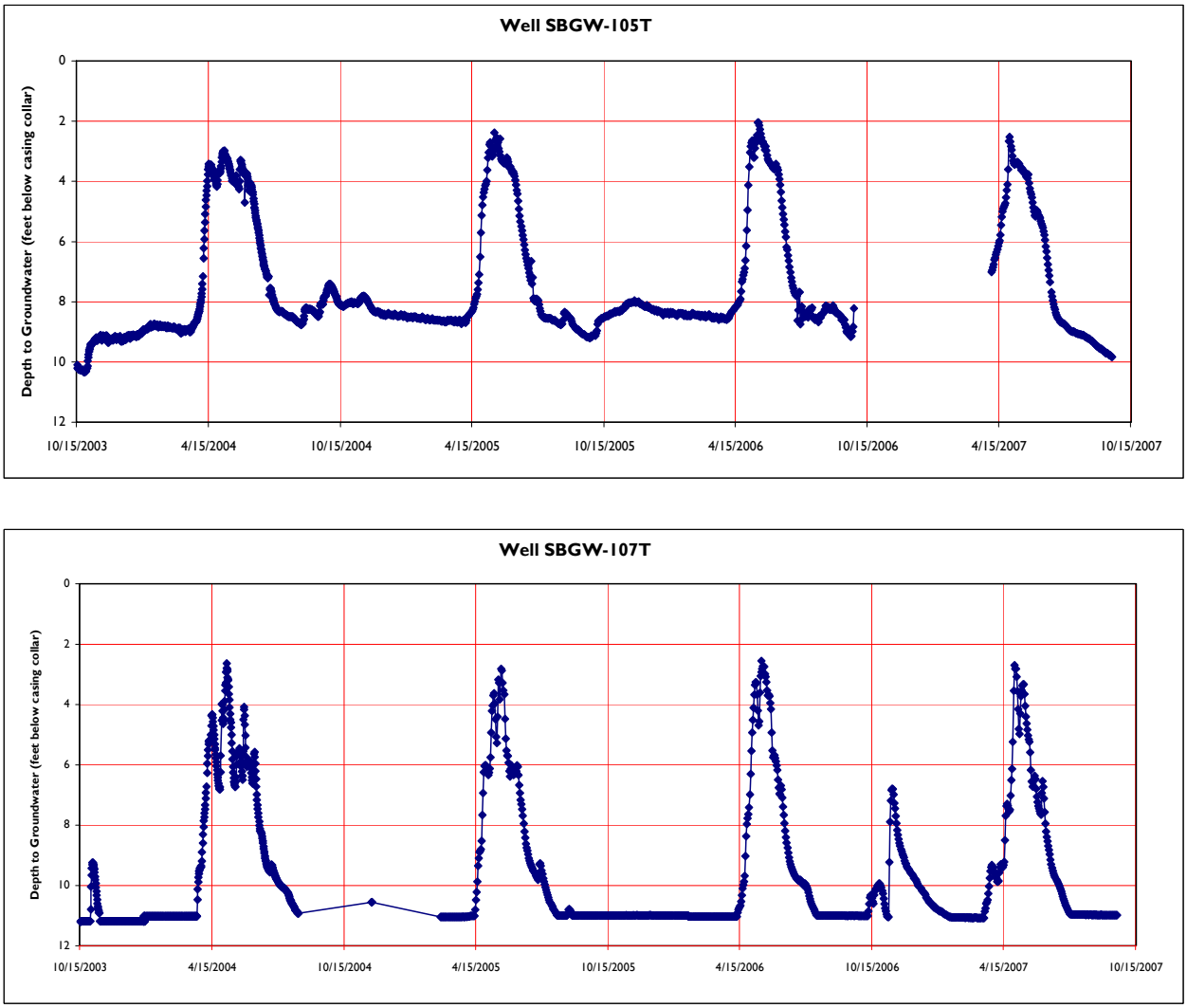


Figure 18. Depth to Groundwater in Repository Wells SBGW-105T and SBGW-107T

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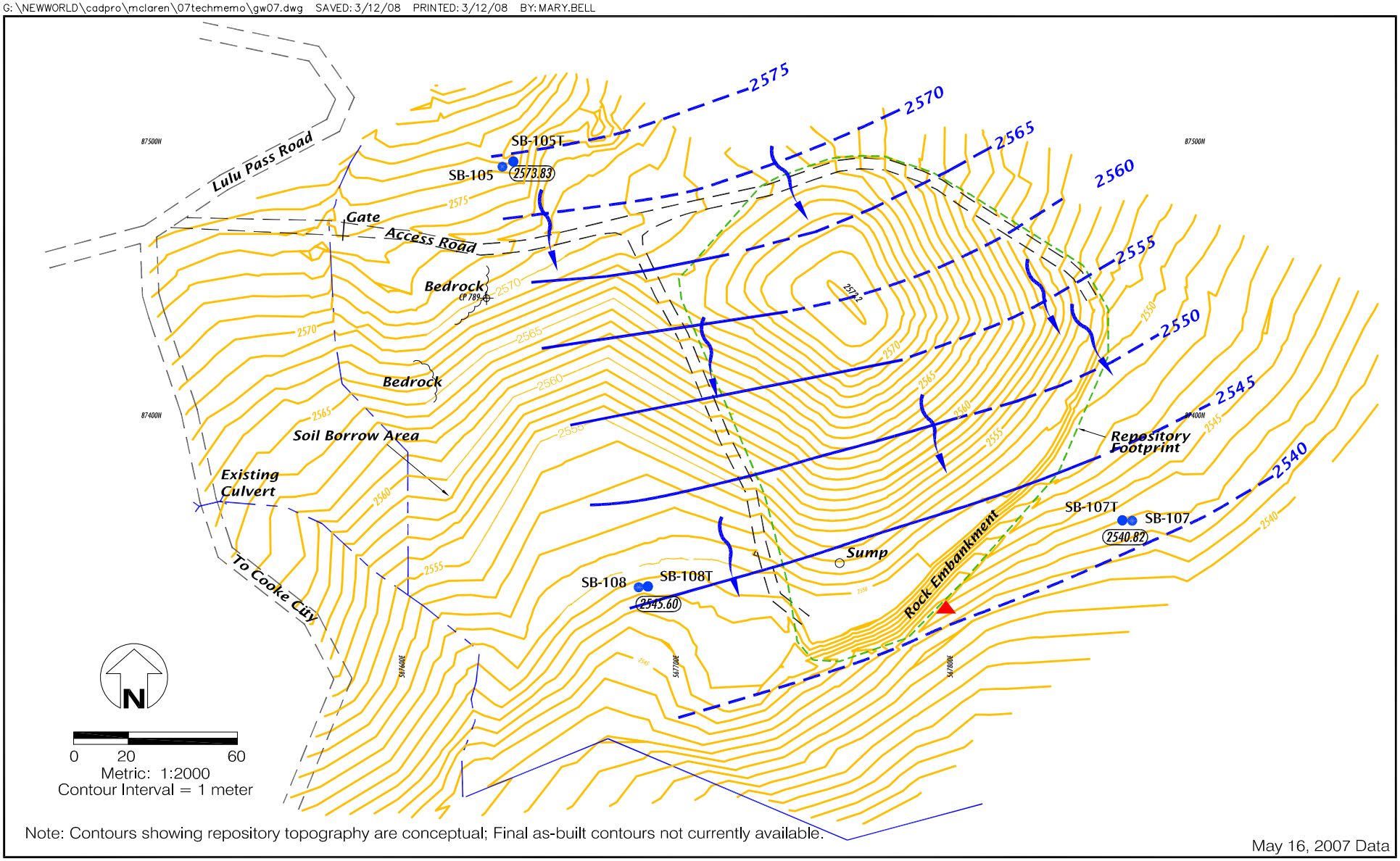


Note: Contours showing repository topography are conceptual; Final as-built contours not currently available.

May 16, 2007 Data

SB-108T Monitoring Well

2545.60 Groundwater Elevation (Meters) In Glacial Till Wells on May 16, 2007

2540 Groundwater Contour
Contour Interval = 5 meters
(Dashed where Inferred)

Groundwater Flow Direction

Repository Seep Sampling Site

7561506.110

Groundwater Elevation in Shallow Till
New World Waste Repository
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 19

TABLE 14
GROUNDWATER QUALITY DATA - NEW WORLD WASTE REPOSITORY AREA
New World Mining District Response and Restoration Project

Parameter [1]	Standard [2]	SBGW 105	SBGW 105T	SBGW 107	SBGW 107T	SBGW 108	SBGW 108T	SBGW 105	SBGW 105T	SBGW 107	SBGW 107T	SBGW 108	SBGW 108T	SBGW 105	SBGW 105T	SBGW 107	SBGW 107T	SBGW 108	SBGW 108T
		7/6/2005						7/10/2006						6/26/2007					
Depth to Water (feet)	--	3.32	7.63	11.31	9.58	8.14	7.07	17.90	8.09	11.41	9.91	9.99	8.31	24.00	7.60	11.90	9.75	9.10	8.20
Field pH (s.u.) [3]	--	9.88	8.27	8.3	6.87	6.78	7.5	8.70	7.78	8.52	7.00	6.88	7.45	8.02	7.69	8.53	7.02	6.44	7.68
Lab pH (s.u.)	--	9.9	7.8	8.8	7.1	7.1	7.6	9.0	7.8	8.5	7.0	7.3	7.7	7.6	7.7	8.5	7.1	7.2	7.6
Lab SC (umhos/cm) [4]	--	294	379	684	431	231	346	275	396	550	454	280	406	252	349	529	521	230	481
TDS	--	238	228	474	252	137	207	216	295	334	260	150	230	211	206	354	312	132	303
Hardness (CaCO3) [5]	--	12	196	103	229	118	184	27	173	100	222	132	203	46	188	103	268	130	239
Calcium	--	5	57	28	77	39	62	11	51	27	74	43	68	15	54	28	91	42	81
Magnesium	--	<1	13	8	9	5	7	<1	11	8	9	6	8	2	13	8	10	6	9
Sodium	--	65	4	104	2	1	2	46	2	79	2	2	2	39	3	88	3	2	2
Potassium	--	1	2	1	<1	<1	<1	2	1	1	<1	<1	<1	2	1	1	<1	<1	<1
CaCO3 Alkalinity	--	127	178	183	198	110	159	131	265	190	202	119	192	116	157	187	195	109	172
CO3 Alkalinity	--	47	0	9	0	0	0	6	0	3	0	0	0	3	0	6	0	0	0
HCO3 Alkalinity	--	60	218	205	241	134	194	148	323	225	246	145	234	136	191	216	238	133	210
Acidity as CaCO3	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<5	<5	<5	<5	<5
Sulfate	--	25	23	170	22	8	16	17	24	79	23	9	27	15	20	80	47	9	23
Chloride	--	2	2	2	1	2	2	1	<1	2	2	4	4	2	6	3	7	5	8
Aluminum	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	0.005	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper	1.3	JR 0.001	JR 0.001	JR 0.003	JR 0.001	JR 0.001	JR 0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	0.001	<0.001
Iron	0.3	JR <0.01	0.5	JR <0.01	JR <0.01	JR <0.01	JR <0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	<0.01	<0.01
Lead	0.015	JR 0.001	JR <0.001	JR <0.001	JR 0.001	JR 0.001	JR 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	0.05	<0.003	0.23	0.14	<0.003	<0.003	<0.003	<0.003	0.069	0.022	<0.003	<0.003	<0.003	<0.005	0.12	0.014	<0.005	<0.005	<0.005
Zinc	2	JR 0.04	JR 0.03	JR <0.01	JR <0.01	0.1	JR <0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:
1 All chemical constituents are dissolved (filtered through a 0.45 micron filter); units are in milligrams per liter unless otherwise noted
2 Human health standard (or guideline for iron and manganese) (MDEQ, 2004); the -- indicates no standard applies
3 s.u. = standard units
4 SC = specific conductance in umhos/cm (micromhos per centimeter)
5 CaCO3 = calcium carbonate
J The associated value is estimated
JR The associated value is estimated due to rinsate blank contamination

Shading indicates exceedance of human health standard or guideline

Shading indicates value is reported in total concentration, not dissolved

All three well pairs sampled in 2007 had pH values in the neutral to alkaline range, with the highest pH of 9.88 s.u. measured in the upgradient bedrock well SBGW-105 (**Table 14**). Review of 2005 to 2007 data (**Table 14**) indicates that copper continues to be detected in wells SBGW-107 and -108 but has not increased; iron has been variable in well SBGW-105T; manganese has been variable in wells SBGW-105T and -107; and zinc was detected in wells SBGW-105, -105T, and -108 in 2005 but is now below the PQL in all of the wells. Consistent with previous monitoring results, the concentration of manganese in the sample collected from well SBGW-105T in 2007 exceeded the human health guideline.

Repository Seep

The Repository Seep station is a small seep discharging from the rock toe at the base of the repository (**Figure 19**). This site was monitored on June 14, 2007 and flow was visually estimated at a maximum of 0.5 gallon per minute (less than or equal to 0.001 cfs). The seepage was observed to infiltrate into the ground within ten feet of the base of the rock toe. This seep has been sampled once each field season since 2002 (with exception of 2003), to characterize the discharge and serve as an indicator for potential leakage of repository sump fluids. A drainage sand layer constructed beneath the repository bottom liner also allows groundwater to flow out from the base of the rock toe. A summary of analytical results since 2002 are presented in **Table 15**. Results are also presented in **Table A-1** of **Appendix A-1**). Total recoverable concentrations of aluminum, cadmium, copper, iron, lead, and manganese were detected at concentrations above the PQL in June 2007. Concentrations of iron and manganese exceeded human health guidelines and lead exceeded the human health standard. Concentrations of iron and lead exceeded chronic aquatic life standards. Review of **Table 15** indicates increased SC and TDS, hardness, aluminum, copper, iron, lead, and manganese concentrations in the 2006 and 2007 monitoring events compared with the previous three (2002 through 2004) monitoring events. Water from the seep is calcium-bicarbonate and is similar in chemistry to the shallow till wells monitored (**Table B-1, Appendix B-1**).

TABLE 15
REPOSITORY SEEP WATER QUALITY DATA
New World Mining District Response and Restoration Project

Parameter [1]	Standard [2]	Repository Seep or West Repository Toe Seep				
		6/30/2002	5/21/2004	6/28/2005	6/26/2006	6/14/2007
Flow (cfs)	--	--	--	* 0.002	* 0.0002	* 0.001
Field pH (s.u.) [3]	--	7.12	--	6.8	6.7	7.7
Lab pH (s.u.)	--	7.5	7.5	7.4	7.2	7.2
Lab SC (umhos/cm) [4]	--	285	255	245	348	429
TDS	--	--	145	141	214	371
Hardness (CaCO3) [5]	--	175	129	125	167	222
Calcium	--	52	40	40	55	69
Magnesium	--	11	7	6	10	12
Sodium	--	4	2	2	4	5
Potassium	--	<1	<1	<1	2	3
CaCO3 Alkalinity	--	122	123	107	141	138
CO3 Alkalinity	--	0	0	0	0	0
HCO3 Alkalinity	--	149	149	131	172	168
Acidity as CaCO3	--	<2	<2	<2	<2	<5
Sulfate	--	35	16	13	25	38
Chloride	--	4	1	2	2	9
Aluminum	--	0.2	0.3	<0.05	2.49	2.55
Cadmium	0.005	<0.0001	<0.0001	<0.0001	<0.0001	0.0001
Copper	1.3	0.002	0.001	0.002	0.006	0.008
Iron	0.3	0.4	0.42	<0.01	3.13	2.93
Lead	0.015	0.002	<0.001	0.001	0.009	0.017
Manganese	0.05	0.04	0.012	0.01	0.27	0.33
Zinc	2	<0.01	<0.01	<0.01	0.01	<0.01

Notes:
1 All chemical constituents are dissolved (filtered through a 0.45 micron filter); units are in milligrams per liter unless otherwise noted
2 Human health standard (or guideline for iron and manganese) (MDEQ, 2004);
-- : indicates no standard applies * = Flow visually estimated
3 s.u. = standard units
4 SC = specific conductance in umhos/cm (micromhos per centimeter)
5 CaCO3 = calcium carbonate

Shading indicates exceedance of human health standard or guideline

Shading indicates value is reported in total recoverable concentration, not dissolved Cations, Anions, Alkalinity either total or dissolved

Repository Sump

Fluids accumulating in the repository sump were monitored using a continuous water level recorder and by collecting samples of sump fluids in May and September 2007 for laboratory analysis. **Figure 20** shows the sump water level for 2005 through 2007 along with the groundwater level in the downgradient till well (SBGW-107T) and surface water flow at station SBC-4 on Soda Butte Creek (USGS real time station 06187915). As in 2005/2006, water level in the sump began to rise soon after the sump was emptied of fluid in late September 2006. The continuous water level recorder indicated a steady accumulation of fluid through the winter with

a slight inflection toward a steeper rate of accumulation beginning around March 19, 2007 and lessening around mid-May 2007 (**Figure 20**). On September 28 and 29, 2007, approximately 22,500 gallons of sump fluids were removed.

Figure 20 shows that water level rise in the sump, during the spring of 2005 and 2006, was coincident with the onset of snowmelt, which was also indicated by increasing stream flow in Soda Butte Creek and rising groundwater levels in the repository wells. The steeper rate of accumulation of sump fluids characterizing the spring of 2005 and 2006 was not as evident in the spring of 2007. This may, in part, be due to completion and sealing of the liner.

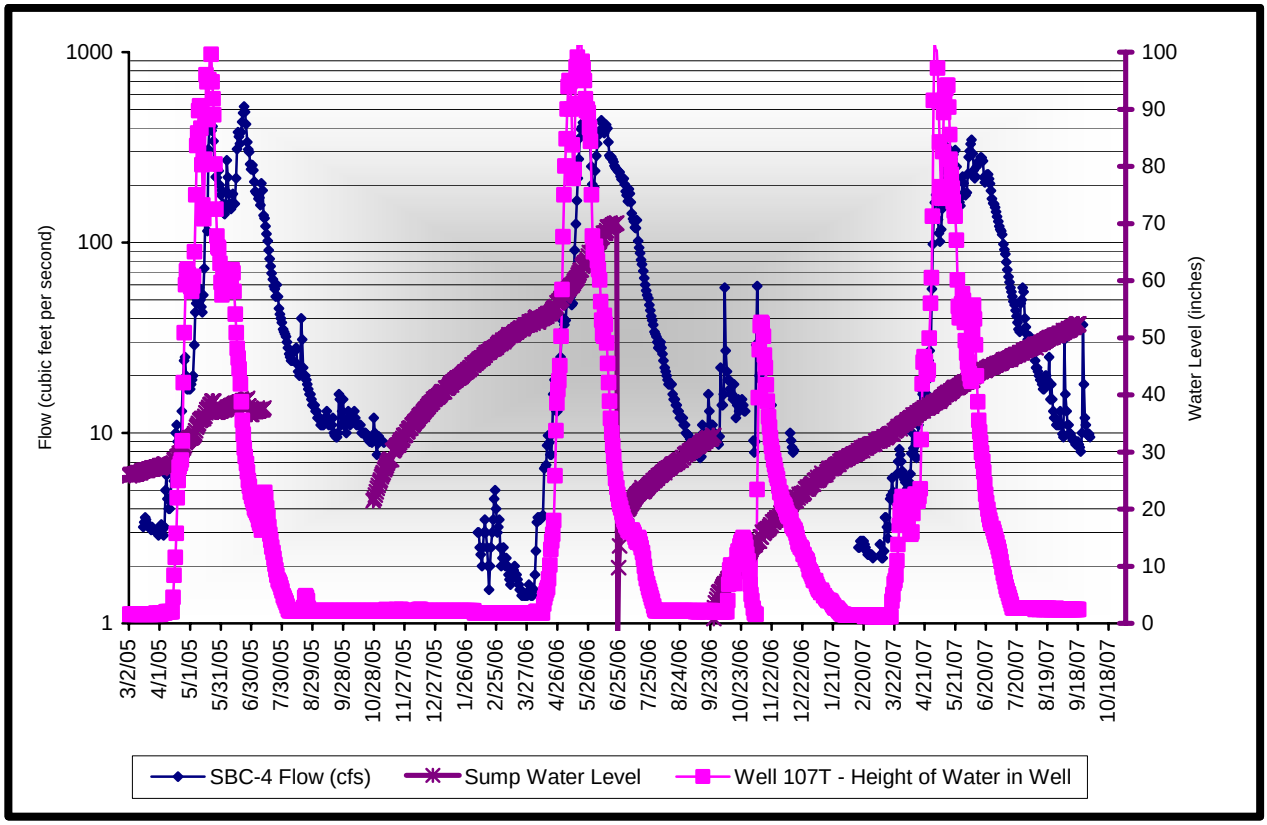


Figure 20. Repository Sump Water Level Compared to Groundwater Levels in Well SBGW-107T and Surface Water Flow in Soda Butte Creek at Station SBC-4

Water chemistry of the sump fluids collected in May and September (**Table B-1; Appendix B**) is similar to that measured in 2005 and 2006 (Maxim, 2006 and Tetra Tech 2007b). The pH of the fluid is near-neutral (6.5 to 6.6 in 2007), and concentrations of alkalinity, sulfate, TDS, iron, and manganese are one to several orders of magnitude higher than groundwater sampled from the repository wells. Other than iron and manganese, all other metals in the sump fluid were at or near the PQL. Comparison of analytical results of sump fluids with those of the paired wells indicates that there have been no impacts to groundwater by leakage of sump fluids.

3.3 MCLAREN PIT AREA SURFACE WATER AND GROUNDWATER MONITORING

This section presents surface water and groundwater data collected in the McLaren Pit area during 2007 compared with previously collected data. Monitoring in the McLaren Pit area has been continued to evaluate surface water and groundwater conditions following capping of the former McLaren Pit. Construction of the McLaren Pit cap was completed in October 2003.

3.3.1 Surface Water

Seven surface water stations were monitored in 2007 as in previous years. Stations DCT-7, DCT-8, DCT-9, and USGS-1700 are located on tributaries to Daisy Creek below the McLaren Pit. Stations DCSW-101, DCSW-102, and DCSW-103 are subsurface drains from under the McLaren Pit cap that discharge into a Daisy Creek tributary, upon which station DCT-8 is located (also know as the DCT-8 tributary). The subsurface drains were installed during the McLaren Pit Response Action to provide outlets for springs originating from bedrock in the area of the high wall. McLaren Pit area surface water stations were monitored in June, July, and September 2007.

As in all previous monitoring events, surface water flows measured in June and July represent the “high flow” period and were highest of all three monitoring events conducted in 2007. Monitoring conducted during August through October is considered the “low flow” period. No monitoring has been conducted between November and May.

In 2007, June surface water flows decreased about 96% to a “low flow” period measured in mid September. Snow cover allowed only one of the three McLaren Pit subsurface drains, DCSW-102 to be monitored in June. All three drains were monitored in mid July along with stations DCT-8 and DC-2 that were monitored a second time during the falling hydrograph of the “high flow” period. Field measurements and analytical results for these stations are contained in **Table A-1 (Appendix A-1)**. **Figure 4** shows the locations of surface water stations monitored in the McLaren Pit area. Combined flow from the drains was 22.90 gpm in mid July, falling to 4.83 gpm in mid September.

Measured flows at station DCT-8 were 1.55 cfs (696 gpm), 0.104 cfs (46.7 gpm), and 0.051 cfs (22.9 gpm) in June, July, and September, respectively. Assuming that flow is conserved in the channel between the drain discharge points and station DCT-8, the combined flow of the drains contributed 49 and 21 percent of the total flow at DCT-8 in July and September, respectively. July 2007 flow measurements indicate that flow from the drains decline at a slower rate than flow in the Daisy Creek tributaries including station DCT-8, after peak flows in June. Comparison of September monitoring events of 2006 and 2005 indicated similar drain flow contributions (32% and 20%, respectively) at DCT-8.

Table A-1 (Appendix A-1) shows data collected from the McLaren Pit subsurface drains in 2007. Water from these drains exhibited very acidic pH values, ranging between 2.4 and 3.0 s.u., with generally poor water quality (copper and iron concentrations in the mg/L range). Using an average of high flow measurements and an average of low flow measurements collected between 2005 and 2007, the metals contribution from the drains at surface water station DC-2 (for the same flow events) is shown in **Figure 21**. The average load contribution from the drains, at station DC-2, during high flow events between 2005 and 2007 was 82% for

iron with considerable contributions of aluminum (24%), cadmium (37%), copper (61%), manganese (23%), and zinc (38%). The average load contribution from the drains, at station DC-2, during low flow events between 2005 and 2007 was 106% for iron with continued significant contributions of aluminum (16%), cadmium (18%), copper (29%), manganese (13%), and zinc (23%). As determined by monitoring during 2007 and previous years, most of the combined load from the three subsurface drains is contributed by DCSW-101.

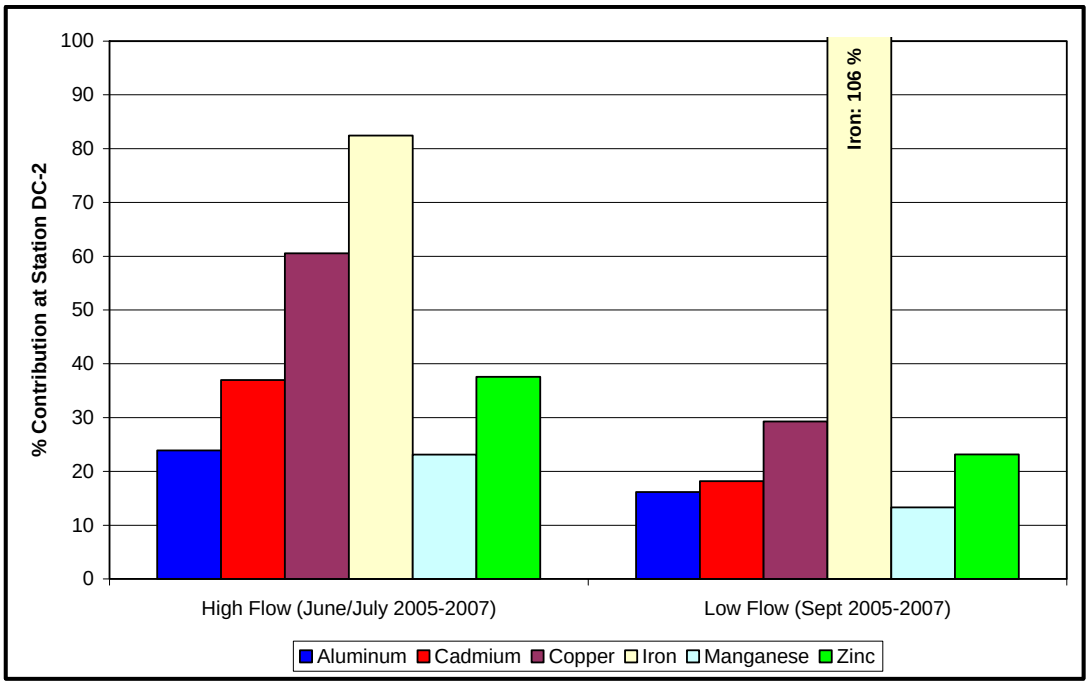


Figure 21. Metal loads calculated for McLaren Pit subsurface drains at Station DC-2

Station DCT-7 is considered to be upgradient and beyond the margin of influence of the McLaren Pit, although it does receive drainage from the borrow area from which cover soil was excavated to cover the McLaren cap. Flow at this station during July and September was 0.047 cfs (21.1 gpm) and 0.0172 cfs (7.7 gpm), respectively. Surface water quality for both monitoring events at station DCT-7 was similar, with near-neutral pH and SC below 400 micromhos per centimeter (µmhos/cm). Total recoverable and/or dissolved concentrations of aluminum, cadmium, and copper exceeded aquatic life criteria at this station in at least one monitoring event. The concentration of manganese exceeded the human health guideline. Monitoring results indicate that concentrations of aluminum, cadmium, copper, and zinc have decreased, at this station, since capping of the McLaren pit.

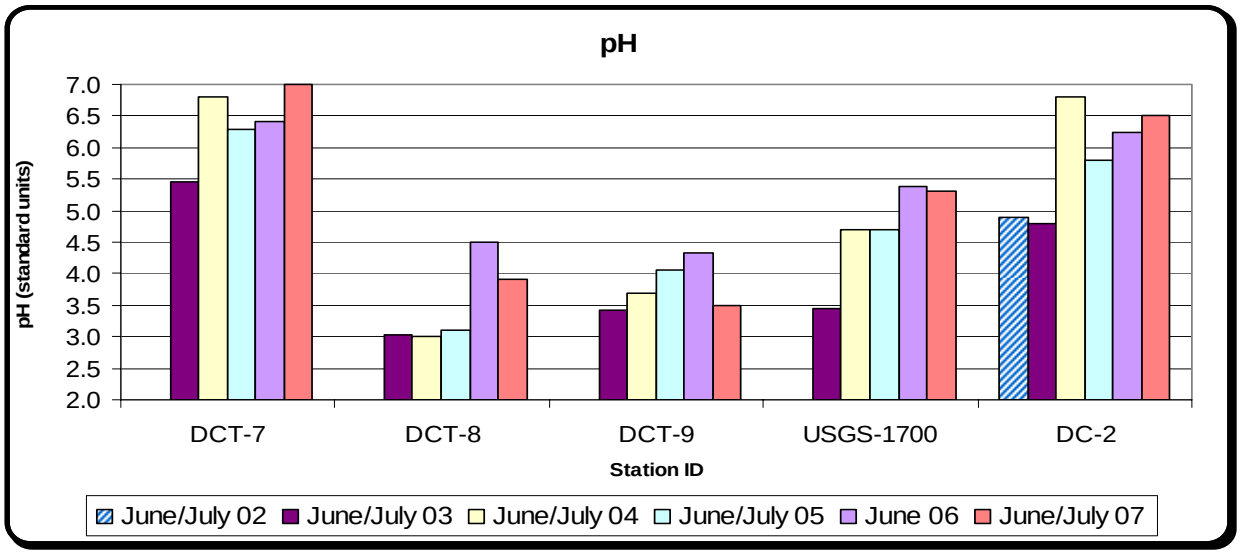
Water quality during the June/July monitoring events at stations DCT-8 and DCT-9 was strongly acidic (lab pH less than 4 s.u.) and mildly acidic at station USGS-1700 (pH 5.3 s.u.). Specific conductance at these two stations in July ranged from 409 µmhos/cm (DCT-9) to 1,059 µmhos/cm (DCT-8). **Figures 22 and 23** display trends in pH, SC, sulfate, copper, and iron during June/July monitoring events at tributary stations and station DC-2 for the years 2002 through 2007. For the most part, field and laboratory results indicated improved water quality in

2007 when compared to 2003 data (prior to the capping of the McLaren pit). Water quality appears to be similar to slightly improved over 2006 field and analytical results.

Except for lead in the sample at station USGS 1700, surface water at station DCT-8 contained the highest metals and sulfate concentrations of the four tributaries sampled in 2007 (**Table A-1**). The higher lead concentrations measured at station USGS 1700 in 2007 are consistent with previous years monitoring results. As in previous monitoring events, 2007 surface water quality data suggest that tributary DCT-8 is a principal pathway for the transport of low pH water containing high metals concentrations from the capped McLaren Pit area (Tetra Tech 2007b).

Figure 24 shows total recoverable copper and iron concentrations at stations DCT-8 and DCT-9 for all measurements collected to date. These graphs indicate that copper concentrations were generally higher in these two Daisy Creek tributaries prior to capping the McLaren Pit (prior to October 2003) and iron concentrations are either lower than previous data or at the lower range of concentrations measured pre-capping. The two groups of data, pre-and post-capping, are distinctly different, with the post-capping data showing much less variability and no extreme concentrations measured in the three years of data collected since October 2003.

Figure 25 shows copper and iron concentrations at stations DCT-8 and DCT-9 plotted against flow. As shown in the graphs, concentrations are lower during higher flow conditions than those measured during lower flow concentrations, presumably due to the dilution effect of the melting snowpack. This relationship is similar to that of station DC-2 (see Section 3.1.1).



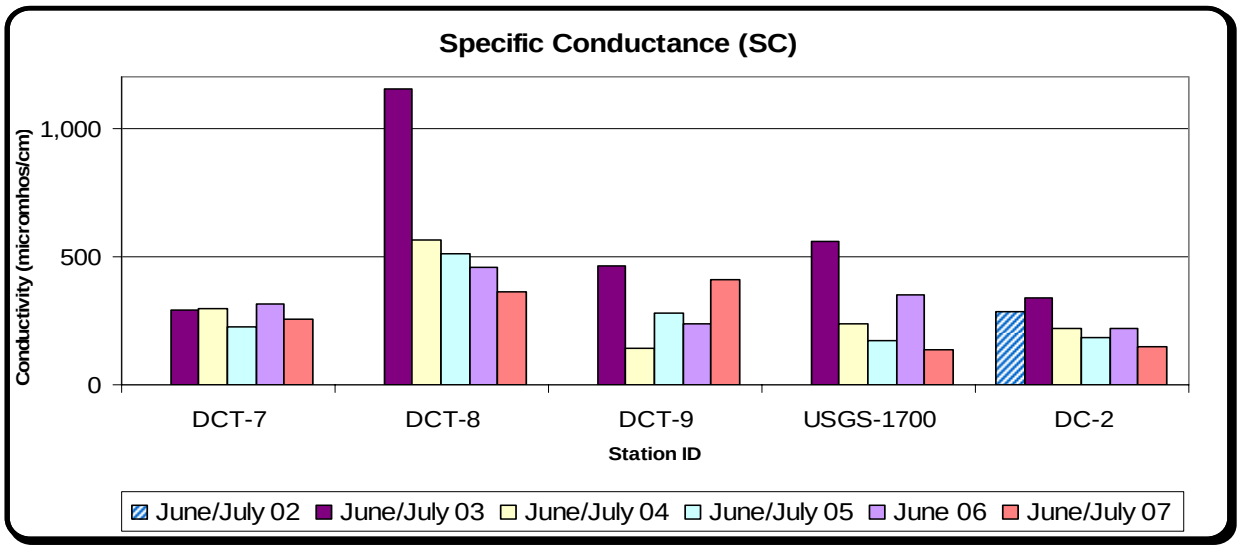


Figure 22. Trends in pH and Specific Conductance at McLaren Pit Tributary Stations and Station DC-2

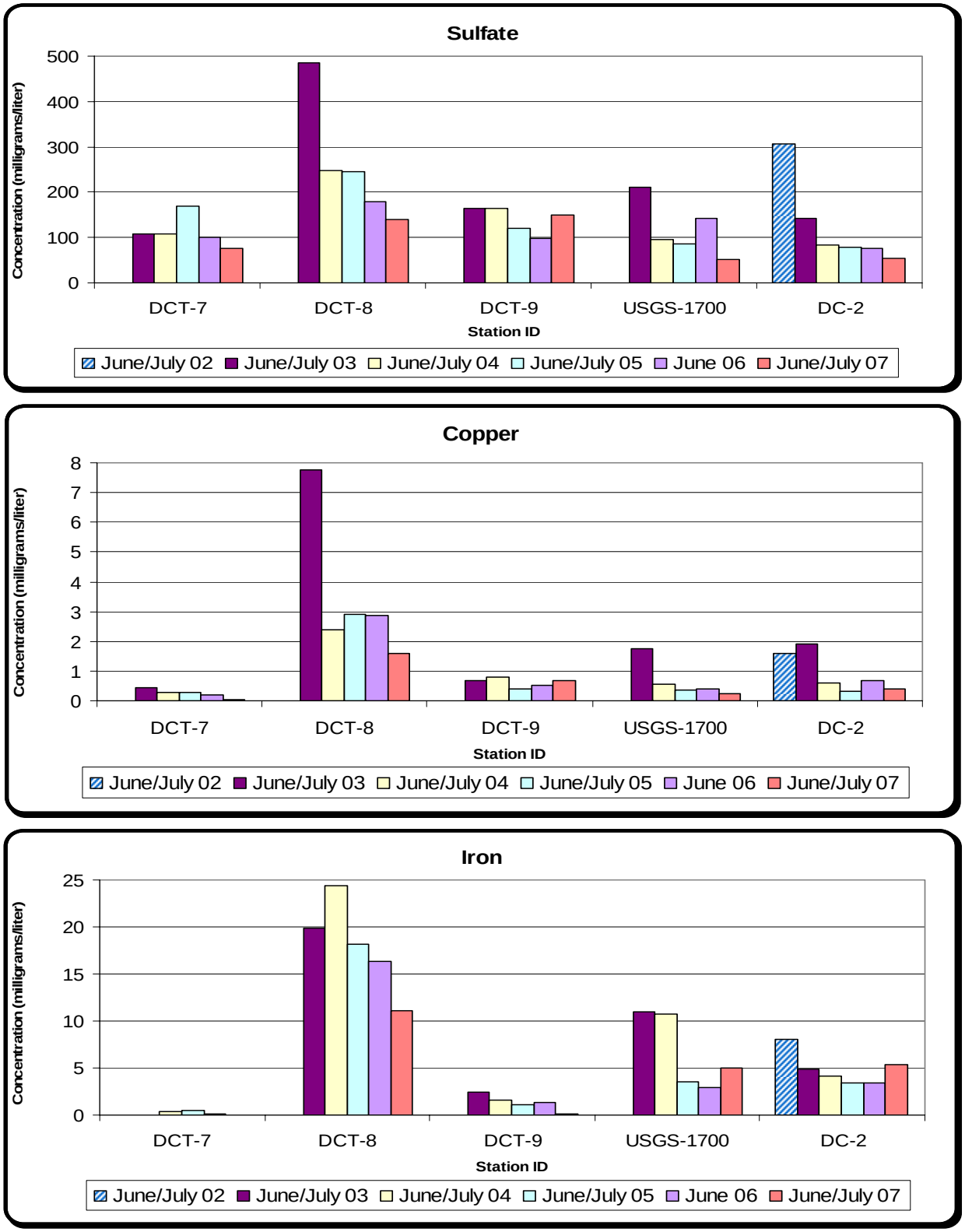


Figure 23. Trends in Sulfate, Copper, and Iron at McLaren Pit Tributary Stations and Station DC-2

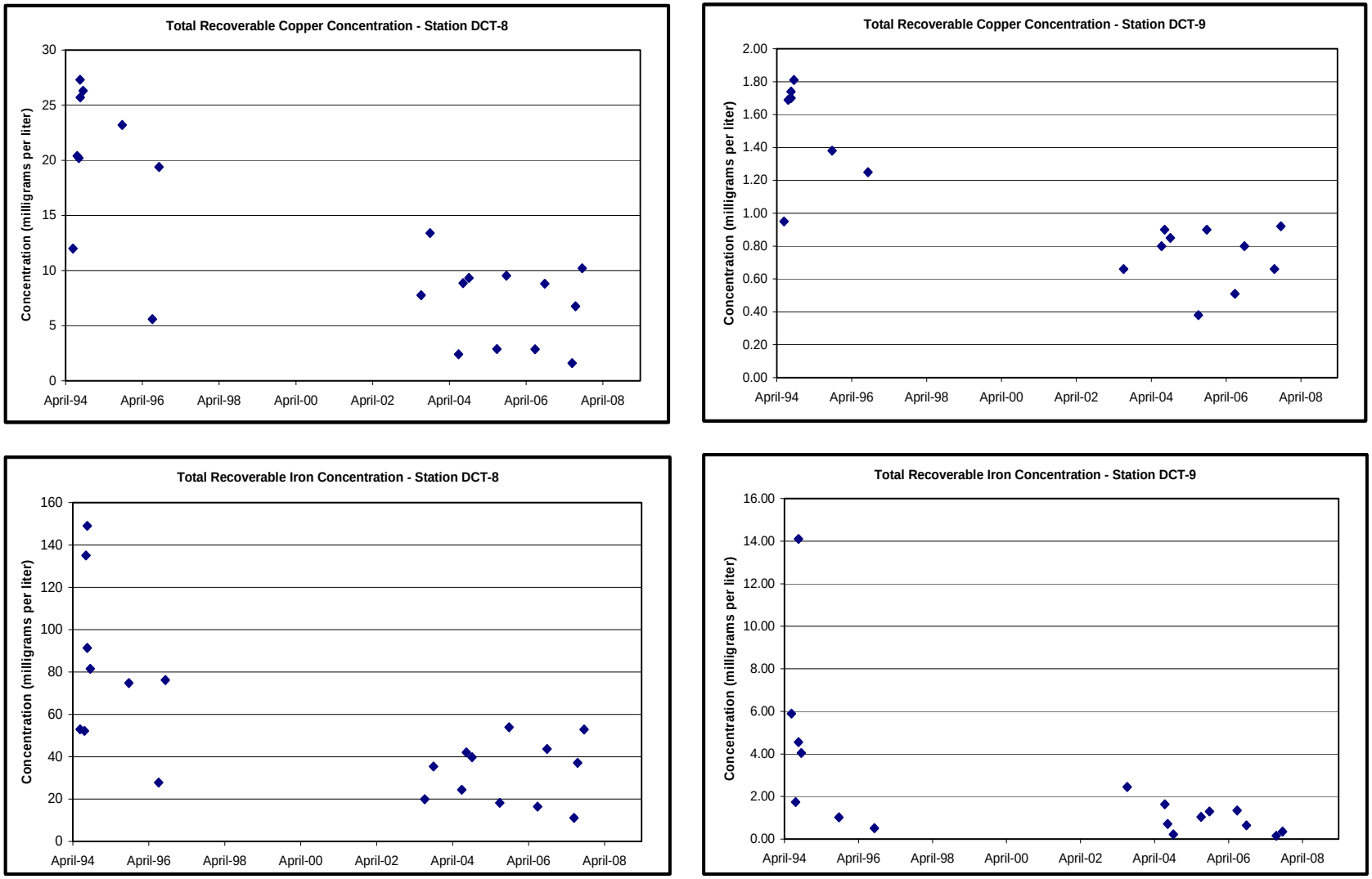
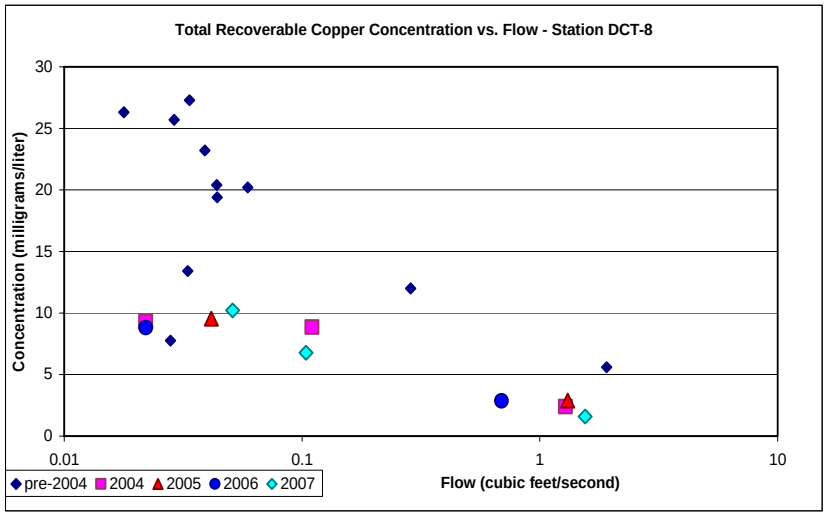
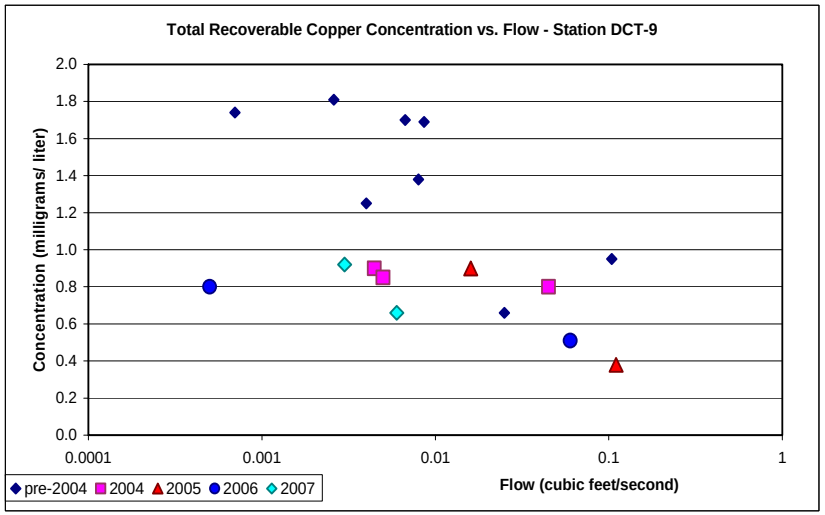
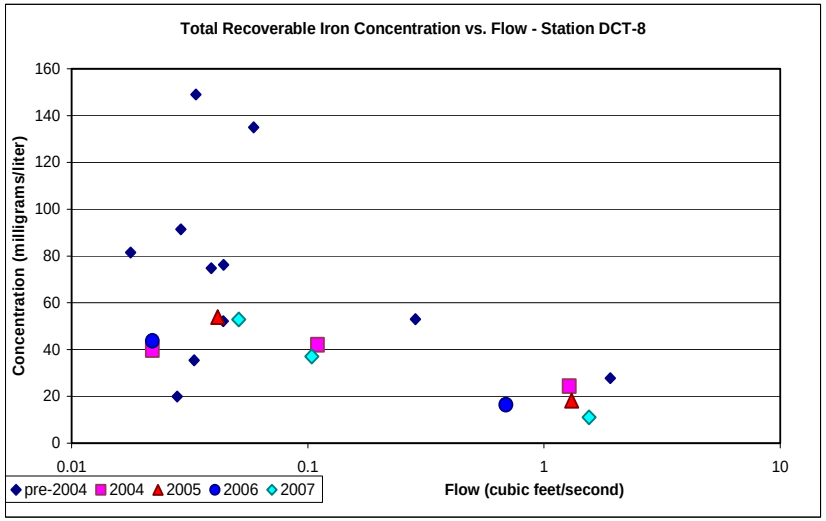


Figure 24. Total Recoverable Copper and Iron Concentrations Measured at Stations DCT-8 and DCT-9







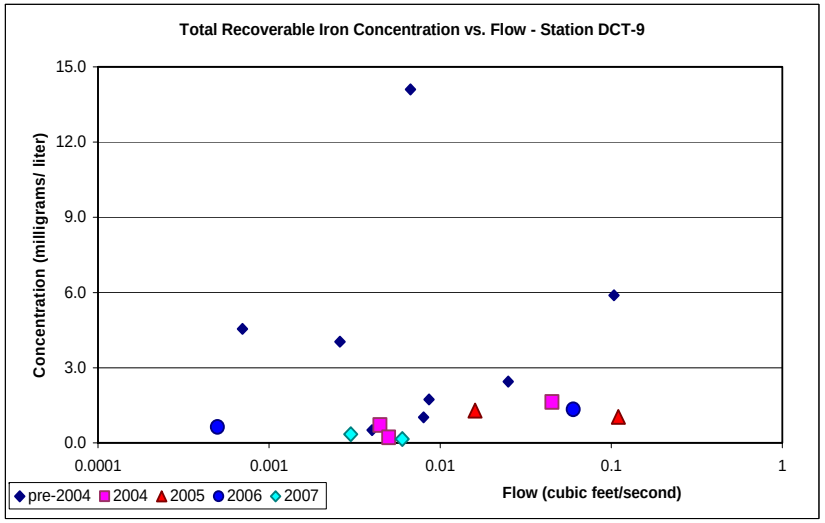


Figure 25. Total Recoverable Copper and Iron Concentrations vs. Flow at Stations DCT-8 and DCT-9

3.3.2 Groundwater

Figure 4 shows all monitoring well locations in the McLaren Pit area. **Table 3** indicates the wells that were monitored and when groundwater samples were collected for laboratory analysis (July). Monitoring wells DCGW-100 and Tracer 2 are completed in the Meagher Limestone and the Fisher Mountain Intrusive, respectively. These wells are situated upgradient of the former McLaren Pit, and considered as background wells for these two bedrock formations. Wells DCGW-104 and DCGW-105 are completed in waste rock within the McLaren Pit capped area. Two sets of paired wells are located downhill of the capped area and are used to evaluate the interaction between the shallow colluvium (S designation) and shallow bedrock (D designation). These paired wells are DCGW-101S/D and DCGW-111S/D (**Figure 4**). A third well pair (DCGW-103S/D) is located west of the capped area. Only field parameters were collected from this well pair in July 2007.

Other wells sampled below the McLaren pit are completed in shallow colluvium. These wells define the limits of acidic groundwater containing elevated levels of metals between the former pit and Daisy Creek. Laboratory analytical data are presented in **Table B-1** and field parameter data, including depth to groundwater, is included in **Table B-2** of **Appendix B-1**. For brevity in the following groundwater discussion, the prefix (DCGW) used in the monitoring well designation for wells beginning with the number 100 is not used.

Groundwater Level Data

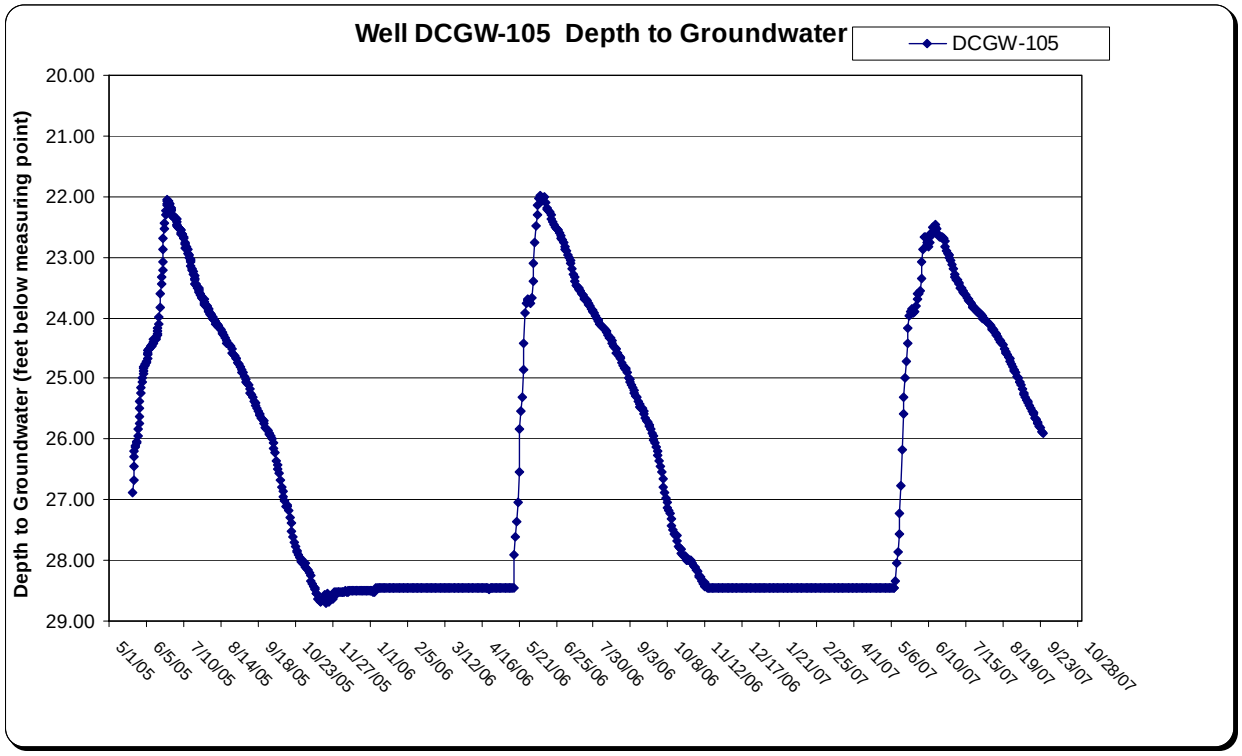
Groundwater levels in wells 104 and 105 were measured using continuous water level instruments (data loggers) that were installed in the wells in May 2005. Hydrographs for these two wells are shown in **Figure 26** for the entire period of record that continuous measurements have been collected.

As shown in the hydrographs, groundwater levels fall below the data loggers and total depth of the wells 104 and 105 through the late fall and winter. The data logger maximum depth to water measurement was recorded on November 15, 2006 in well 105 and February 18, 2007 in well 104. As in the previous two years, the 2007 well hydrographs indicate a quick response to snowmelt, where groundwater levels rise in the spring/early summer (response began on May 10th in well 105 and on May 31st in well 104) and reached their peak height in June (peak reach on June 16th in well 105 and June 23rd in well 104). The total data logger-measured rise in well 105 was 6.0 feet and in well 104 was 5.6 feet. Water levels in these wells were still declining on the last monitoring and data downloading event on September 25, 2007.

As in 2006, the 2007 continuous water level measurements show a three-week lag between the beginning of water level rise in well 105 and the beginning of water level rise in 104. The apparent earlier water level response and peak in well 105 could be attributed to the well's location, being nearer to the McLaren Pit high wall and along the trace of the McLaren Pit subsurface drains. In 2006, both wells showed a similar delayed response, beginning a rise in water levels on May 16 in well 105 and June 4 in well 104. Similarly, peak height in 2006 was reached on June 10 in well 105 and June 17 in well 104.

In 2007 and the previous two monitoring seasons, hydrographs for the two waste rock wells show that shallow groundwater under the McLaren Pit cap follows the seasonal hydrograph.

This indicates that groundwater beneath the cap is recharged in May through June. The source of groundwater recharge could be from groundwater moving laterally beneath the cap and/or groundwater moving upward from the Meagher Limestone and Wolsey Shale formations. Groundwater wells installed in bedrock units located in the pit prior to capping exhibited vertical upward gradients, indicating recharge from deeper bedrock was possible (URS 1998). In addition, the McLaren Pit subsurface drains (DCSW-101, DCSW-102, and DCSW-103), installed during construction of the cap, intercept springs that emanated from bedrock fractures. As these springs are under the cap, saturated conditions in waste rock could potentially be recharged by these springs as well.



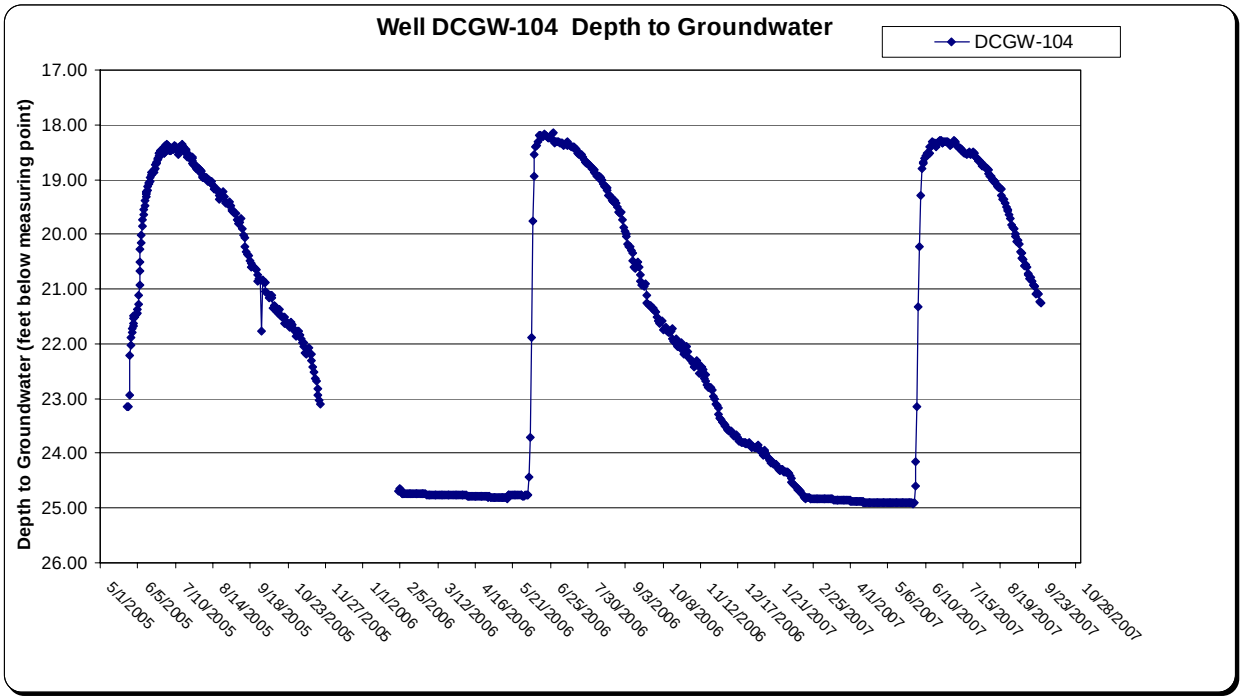
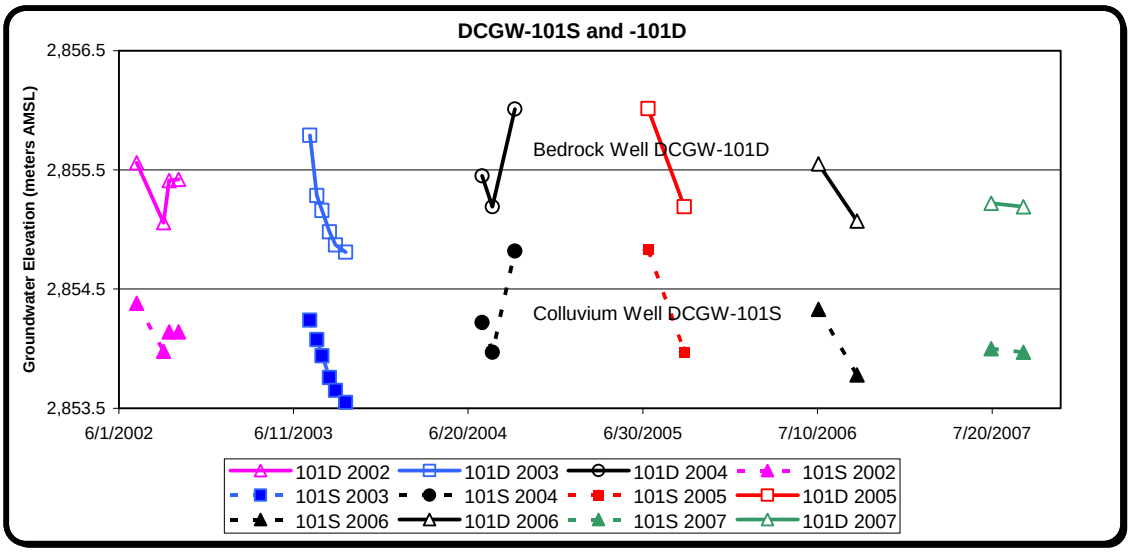


Figure 26. Groundwater Hydrographs for Waste Rock Wells 105 and 104 in McLaren Pit Cap Area

Groundwater elevation trends for paired wells 101S/D and 111S/D are shown in **Figure 27**, with the elevation plotted in meters above mean sea level (AMSL). Groundwater levels declined in both well pairs between July and September 2007. This was also the case in 2003 and 2006 in both well pairs and in 2005 in the 101S/D well pair. Water levels in both well pairs have also risen in previous years in the late summer/early fall, presumably in response to precipitation received in those years.



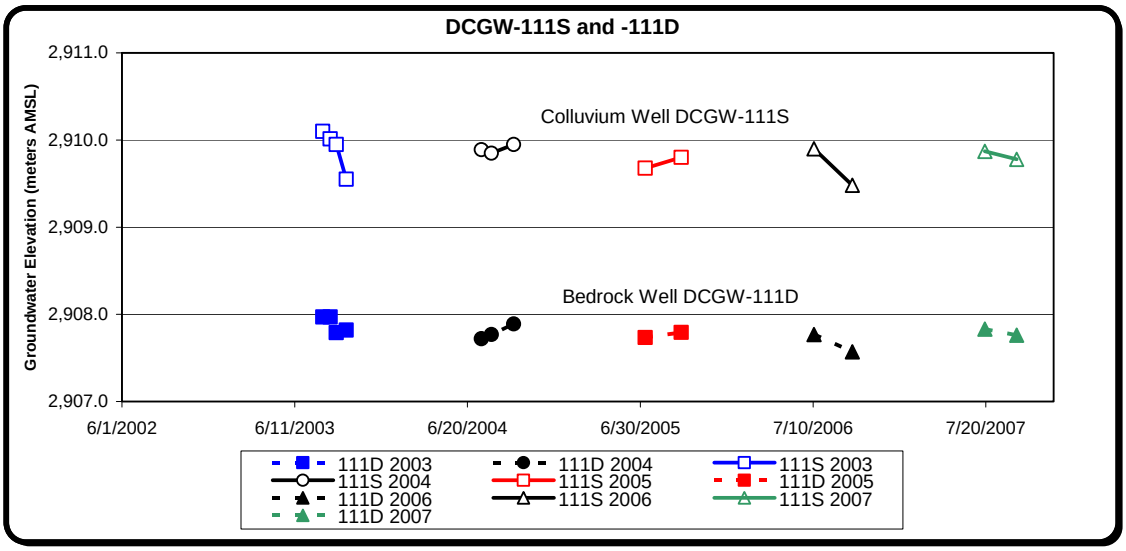


Figure 27. Paired Well Groundwater Hydrographs in the McLaren Pit Area

Consistent with past monitoring, 2007 water level elevations in well pair 111S/D show a downward vertical hydraulic gradient (groundwater elevations in shallow colluvium are higher than in the deeper well) while the opposite is true in 101S/D. Also consistent with past monitoring, 2007 water level elevations in well pair 101S/D exhibit vertical upward gradients and indicate that groundwater from shallow bedrock recharges both the shallow colluvium and likely discharges into Daisy Creek as groundwater encounters the valley bottom.

Other shallow colluvial wells downslope and downgradient of the McLaren Pit include 132, 133, 134, 135, 136, and 137. Groundwater hydrographs of these wells are compared in **Figure 28** since monitoring was initiated in 2002. While groundwater levels in wells 104 and 111S declined between July and September 2007, groundwater levels were practically unchanged in wells (133, 132, and 134) along the trace of the Crown Butte Fault (**Figure 28** and **29**). Data collected in previous years indicate that groundwater levels usually decline between July and September but may also be influenced by precipitation events. The magnitude and direction of groundwater level change appears variable in the well network moving downslope from the McLaren Pit and west from the trace of the Crown Butte Fault (wells 135, 101S, 136, and 137) where groundwater levels increased in all but 101S between July and September.

A groundwater elevation map in shallow colluvium in the McLaren Pit area is shown in **Figure 29** for data collected during the July 2007 monitoring event. Groundwater in the McLaren Pit area generally flow downslope, perpendicular to topographic contours, as it approaches Daisy Creek and then swings parallel to Daisy Creek and flows down valley. Groundwater flow direction is essentially the same as that measured in previous July monitoring events (Maxim 2007a) and prior to completion of the McLaren Pit cap. The Crown Butte Fault, which is shown by the dashed line in **Figure 29**, has been identified as an important conduit for poor quality groundwater flowing from the former pit area into the Daisy Creek drainage (Maxim 2004).

Field and Laboratory Analytical Data

Groundwater field parameter measurements were collected in July 2007 in the majority of wells listed in **Table 3**. The locations of these wells in the McLaren Pit Area are shown in **Figure 5**. A select set of wells were also monitored in September 2007 (**Table 3**) and include the waste rock wells, the well pairs, wells along the trace of the Crown Butte Fault, and wells located along or near the margin of the acidic and metals enriched groundwater. July and September field parameter data from selected wells are shown in **Figure 30**. **Figure 31** presents copper, iron, and sulfate concentrations measured in July 2007. Groundwater field parameter and analytical data are summarized in **Tables B-1** and **B-2** in **Appendix B-1**.

Figure 30 indicates that constituent values did not vary substantially between July and September 2007. Field pH remained within one s.u. and specific conductance (SC) decreased in wells in or adjacent to the McLaren Pit. SC increased in wells downslope of the McLaren Pit. As SC is an indicator of the total concentration of dissolved solids in groundwater, it is likely that major ion concentrations did not change appreciably in these wells during monitoring in 2007. Similar conditions were observed in these wells in previous years (Tetra Tech, 2007b and Maxim, 2006).

Oxidation/reduction potential decreased in well 104 and increased in the other downslope wells, with exception to well 101S, between July and September monitoring events. Dissolved oxygen content decreased in all but wells 132 and 133, which became more oxygenated between July and September monitoring events.

Wells with dissolved oxygen levels that declined one mg/L or less between July and September monitoring events include 101D and 111D. The dissolved oxygen content in wells 101D and 132 remained below one mg/L in the July and September monitoring events. These results are consistent with the 2006 monitoring results (Tetra Tech 2007b).

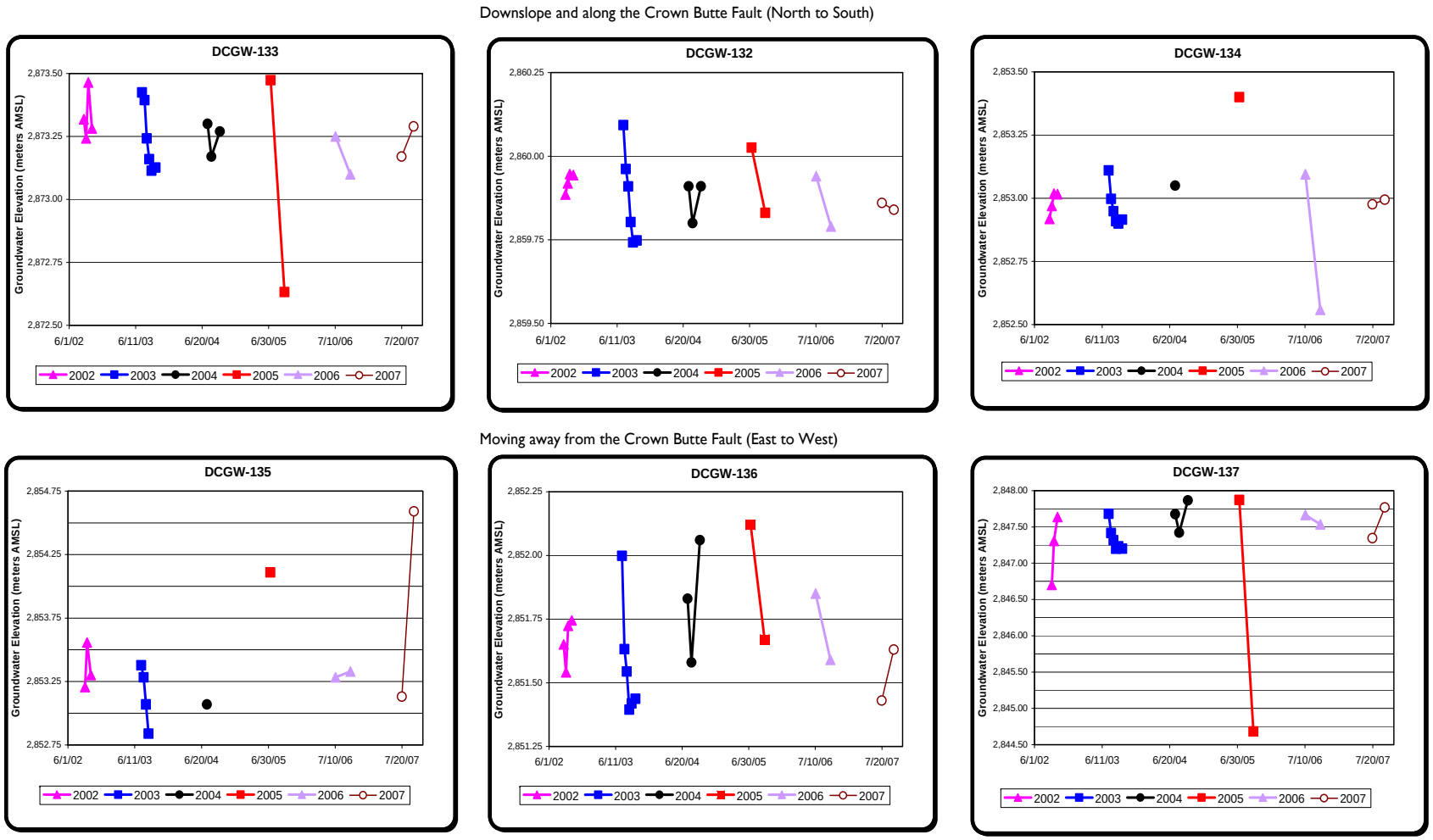


Figure 28. Groundwater Hydrographs in Select Wells in the McLaren Pit Area

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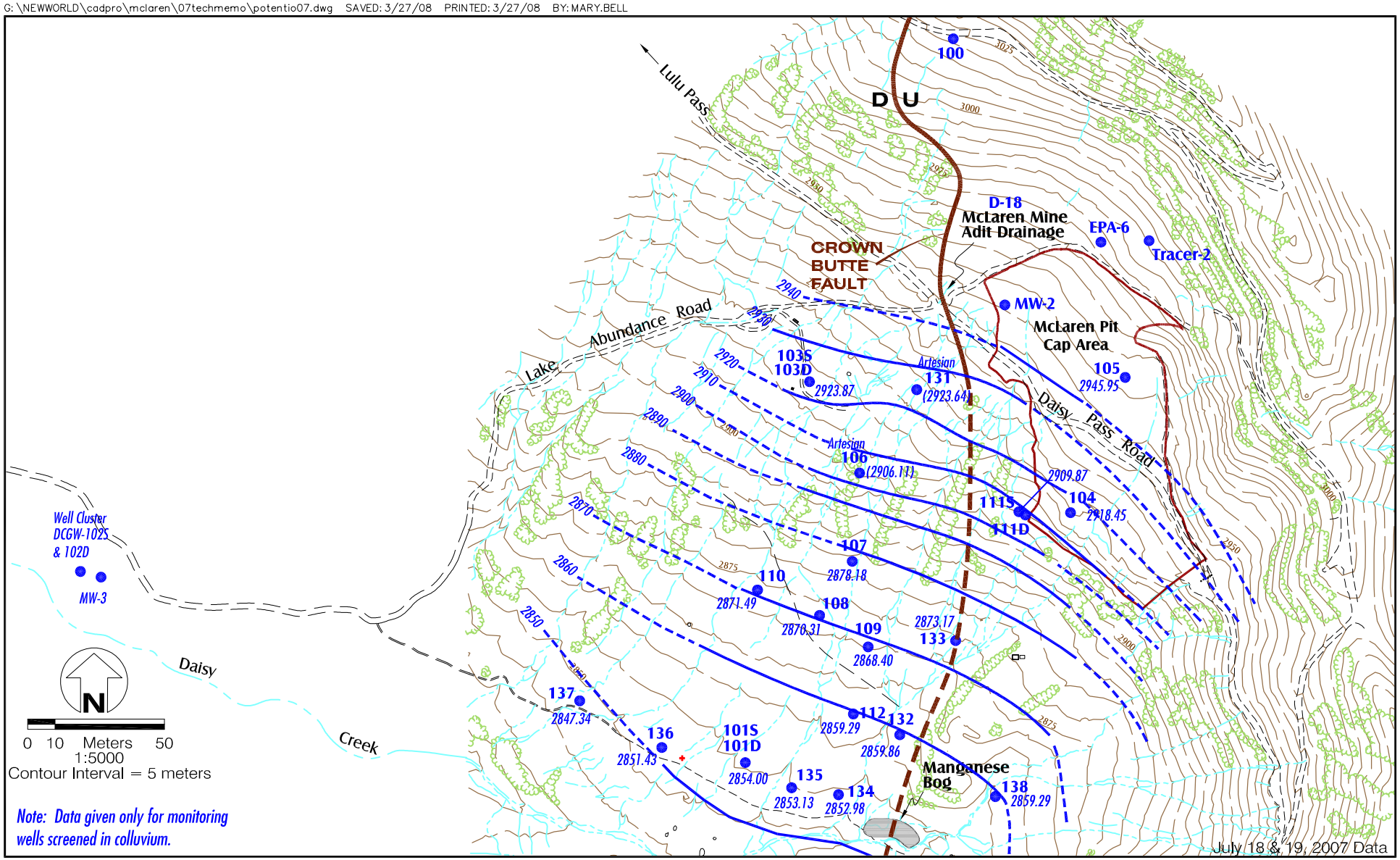


Note: Groundwater elevations in wells MW-2, EPA-6, Tracer 2, and DCGW-100 were not used.

D U — Crown Butte Fault (D - down thrown; U - up thrown) (dashed where inferred)

101 — Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

Groundwater Contour (dashed where inferred)

2847.34 — Groundwater Elevation (meters)

7561506.110

Potentiometric Surface in Shallow Colluvium
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 29

Field pH in waste rock well 104 continues to be the lowest in the McLaren Pit area and concentrations of most constituents were the highest in this well (**Figures 30** through **32**). The furthest downgradient wells (101S/D, 136, and 137) exhibited the highest pH and the lowest concentrations of sulfate, copper, and iron in groundwater. Well 101S exhibited a lower pH and a higher concentration of copper than its shallow bedrock pair (101D), which is consistent with previous monitoring results (Tetra Tech, 2007b). As reported previously, groundwater in 101S may be considerably impacted by acidic and metals-laden surface water flows in tributaries DCT-8 and DCT-9 (Maxim, 2006).

Water quality in paired wells 111S/111D is similar in quality to wells 133 and 132 except for pH, which is notably higher, and iron concentrations, which are relatively low in well 111S (<1 mg/L) and relatively high in well 132 (**Figures 30** and **31)**. Dissolved concentrations of copper and iron are higher in the shallow bedrock well (111D) than the shallow colluvial well (111S) (**Figure 31**). These relationships between shallow colluvium and shallow bedrock water quality are similar to those measured in monitoring events back to 2003 at this location (Maxim, 2004; 2005; 2006; and Tetra Tech, 2007b).

Figure 32 shows a comparison of groundwater data collected during July in shallow colluvial wells for the past six years (2002 to 2007). Data from select wells are arranged from the McLaren Pit area (left side) downslope (right side) or from wells 105 to 137. Overall, July 2007 pH and SC measurements in the shallow colluvial wells were lower than measurements collected in July of previous years. Comparison of the 2007 and 2006 pH measurements (**Figure 32** and **Table B-2** in **Appendix B**) indicates either no change greater than 0.1 s.u. or a decrease in pH between 0.2 to greater than 2 s.u. (well 138). In comparison with 2003 and 2002 pH measurements, the 2007 pH measurements indicated no changes greater than approximately 0.5 s.u. with exception to well 135 where pH had decreased over one s.u. in 2007. Most wells had a lower measured conductivity in 2007 compared with 2006 SC measurements. In addition, SC for most of the wells, had decreased since 2003 and/or 2002 monitoring. Between 2002 and 2007, conductivity increased in well 104 (+400 micromhos/cm) and well 135 (+130 micromhos/cm) (**Table B-2** in **Appendix B**).

Measurements of ORP were consistently lower in 2007 as compared with 2006 and monitoring events previous to 2006. Measurements of DO, overall, were generally higher in 2007 as compared with 2006 and 2003 monitoring events. Increases in DO of at least 2 mg/L between July monitoring events in 2006 and 2007 were noted in wells 101S, 108, 111S, 136, and 138. Measurements of DO in wells 101D, 103D, 106, 107, 112, and 132 remained less than one mg/L between July monitoring events in 2006 and 2007 (**Table B-2** in **Appendix B**).

Copper and iron concentrations in the shallow colluvial wells have been variable since 2002 with decreases of these trace metals in several wells. The copper concentration dropped below the PQL in well 137 after 2003. Iron concentrations have dropped below the PQL in wells 101S and 136 after 2004 and in well 137 after 2003 (**Figure 32**).

Figure 33 shows July 2007 groundwater quality in three bedrock wells located upgradient of the McLaren Pit. Well 100 is screened in the Meagher Limestone, well Tracer 2 is screened in the Fisher Mountain Intrusive, and well MW-2 is screened in the Wolsey Shale. **Figure 33** also includes wells 105 and 104 that are screened in the bottom ten foot section of waste rock and subsurface drain DCSW-101 that has the highest flow of the three drains. Well 100 had the

highest pH of the wells shown and the lowest concentrations of all constituents shown except for manganese. This is consistent with previous years' monitoring data. Well 100 is completed in the same mineralized section of the Meagher limestone formation that was mined in the pit and is believed to be indicative of the quality of groundwater in this formation where undisturbed (i.e., background groundwater quality).

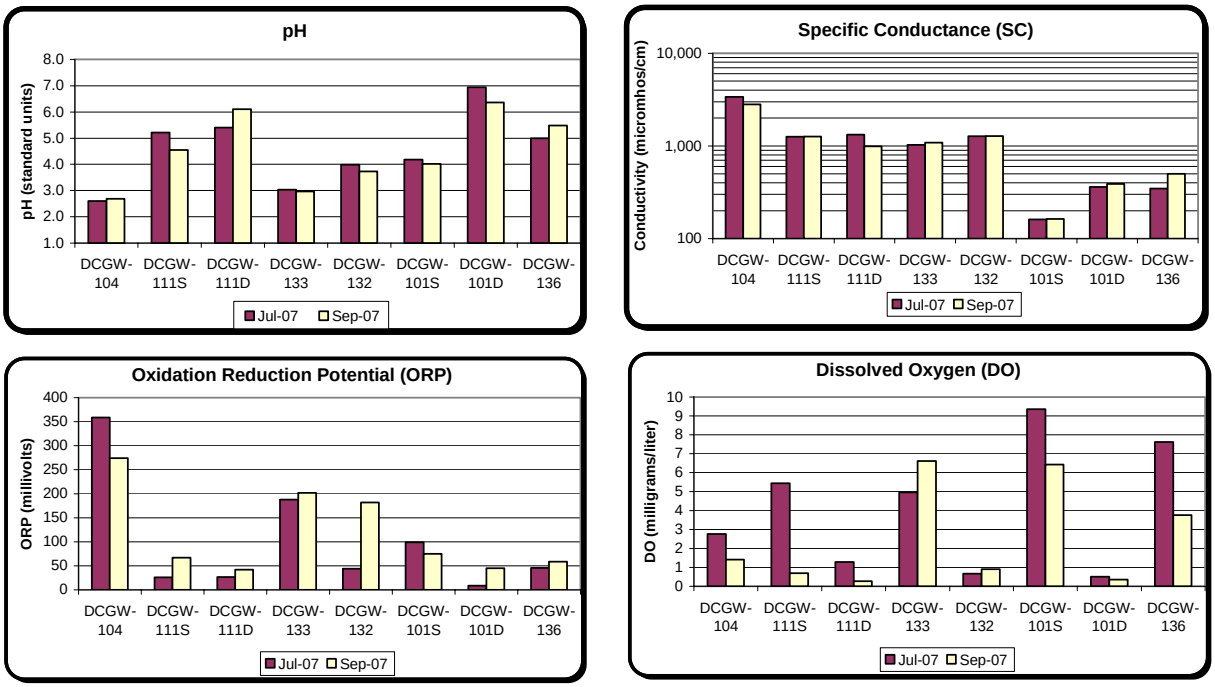


Figure 30. 2007 Field Parameter Measurements for Select Wells in the McLaren Pit Area

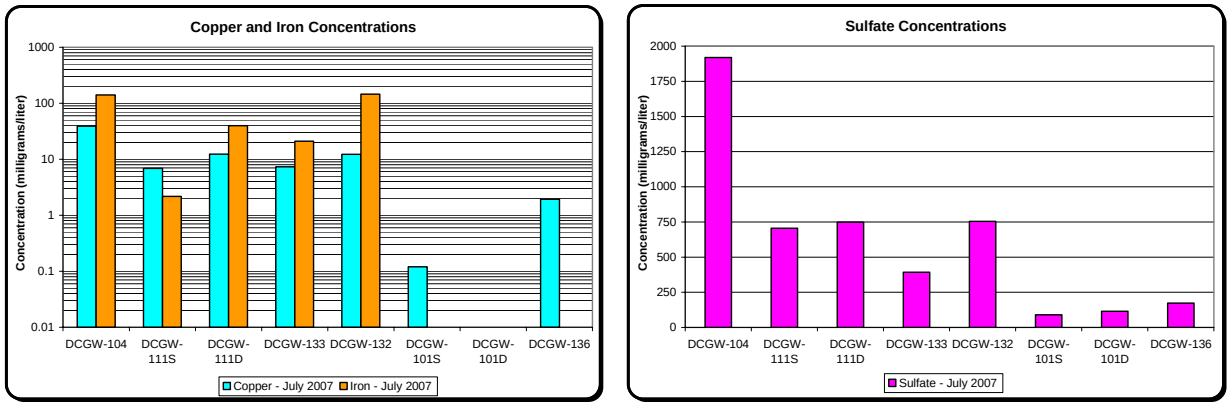


Figure 31. July 2007 Copper, Iron, and Sulfate Concentrations in Select Wells in the McLaren Pit Area

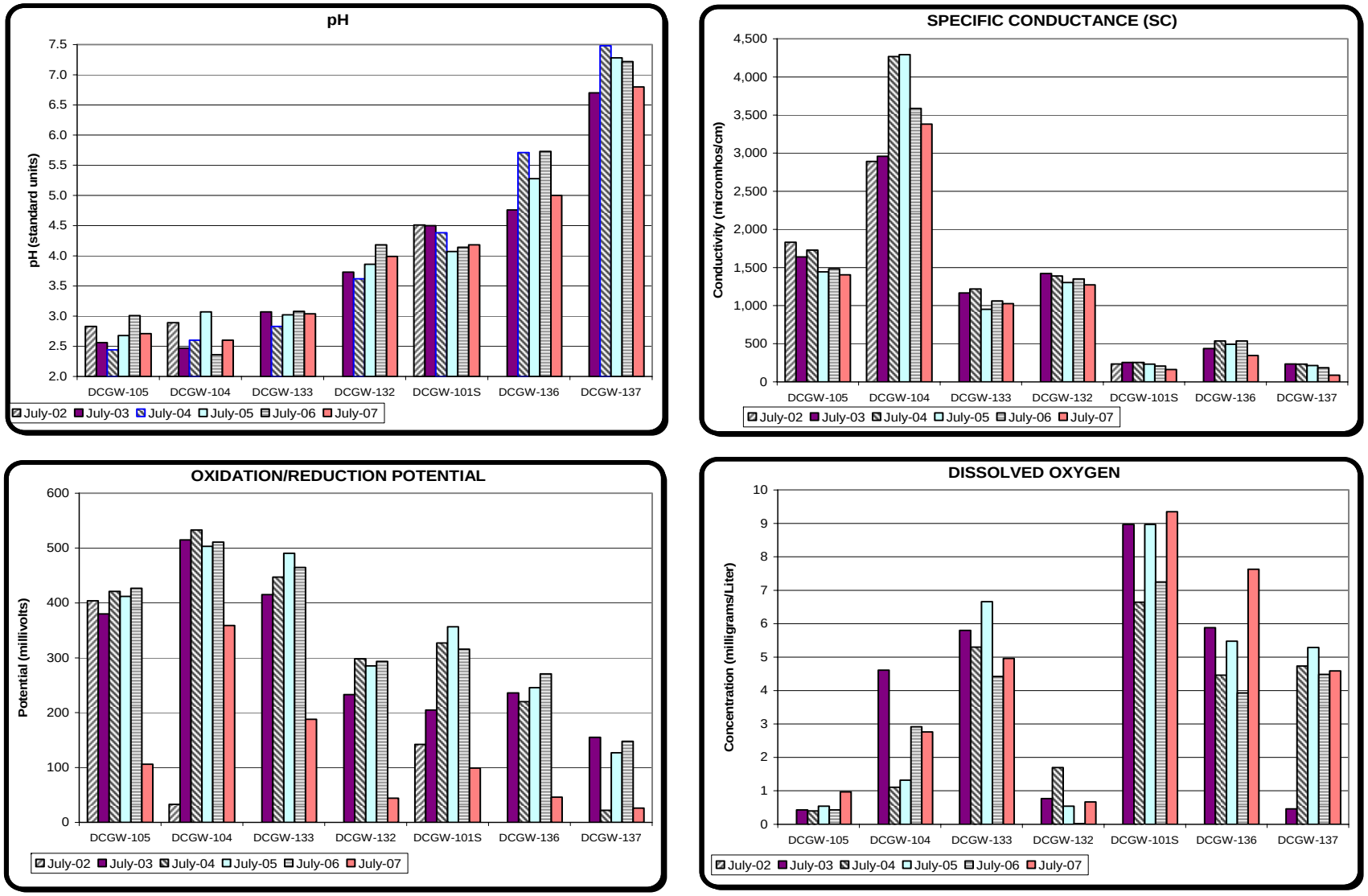
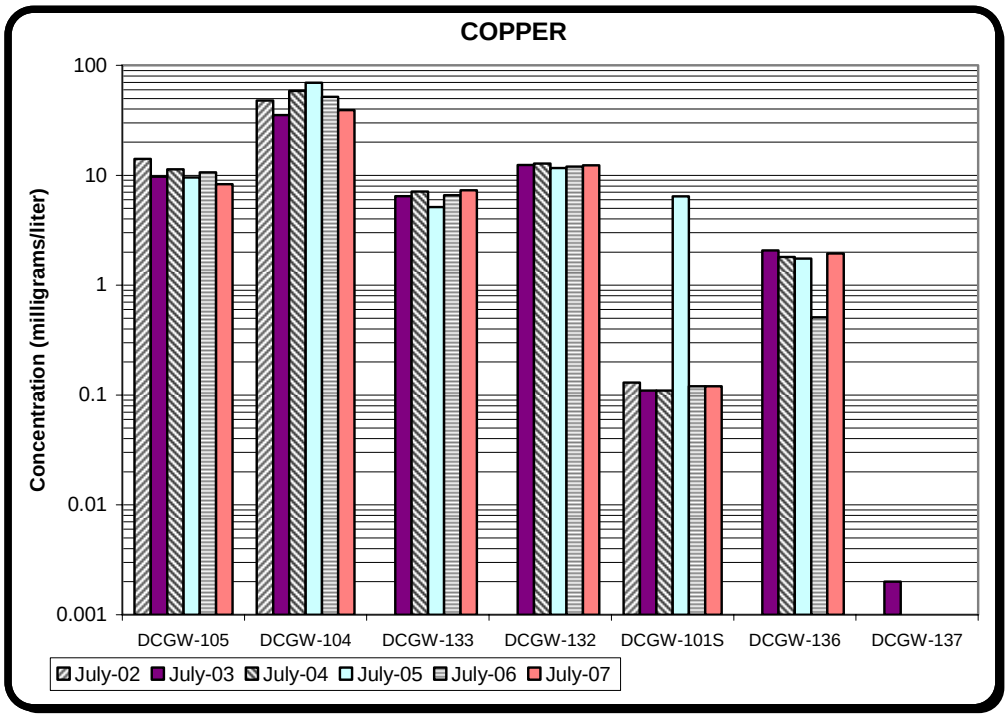


Figure 32. Comparison of Field Parameters and Analytical Data for Select Wells in the McLaren Pit area for 2002 to 2007



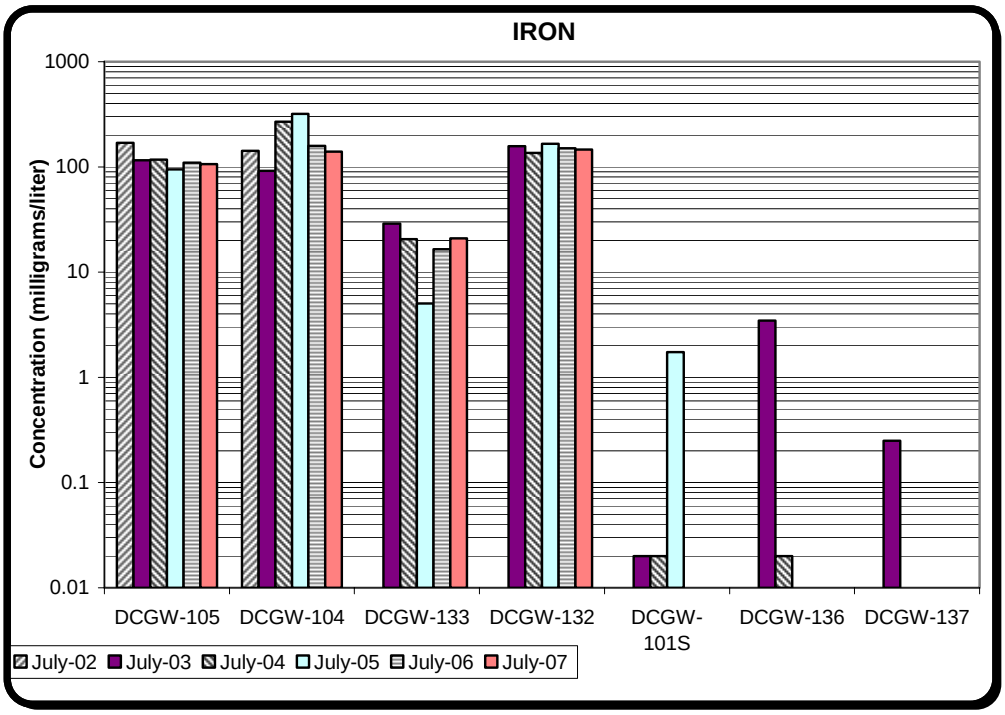
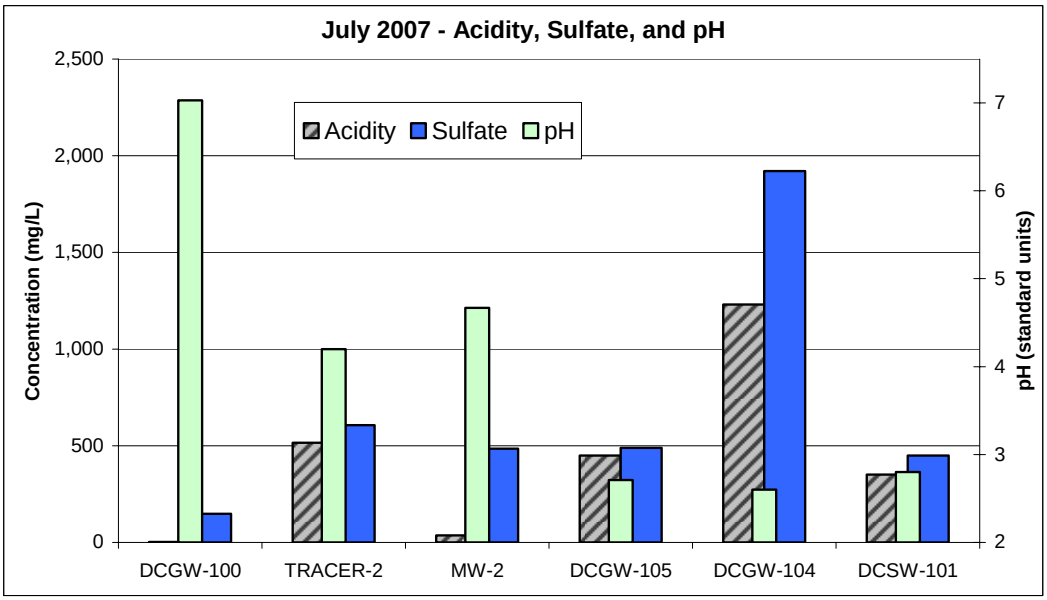


Figure 32. (Continued) Comparison of Field Parameters and Analytical Data for Select Wells in the McLaren Pit area for 2002 to 2007

Note: Copper is not detected in well DCGW-137 after 2003, Iron is not detected in wells DCGW-101S and DCGW-136 after 2004 and in well DCGW-137 after 2003



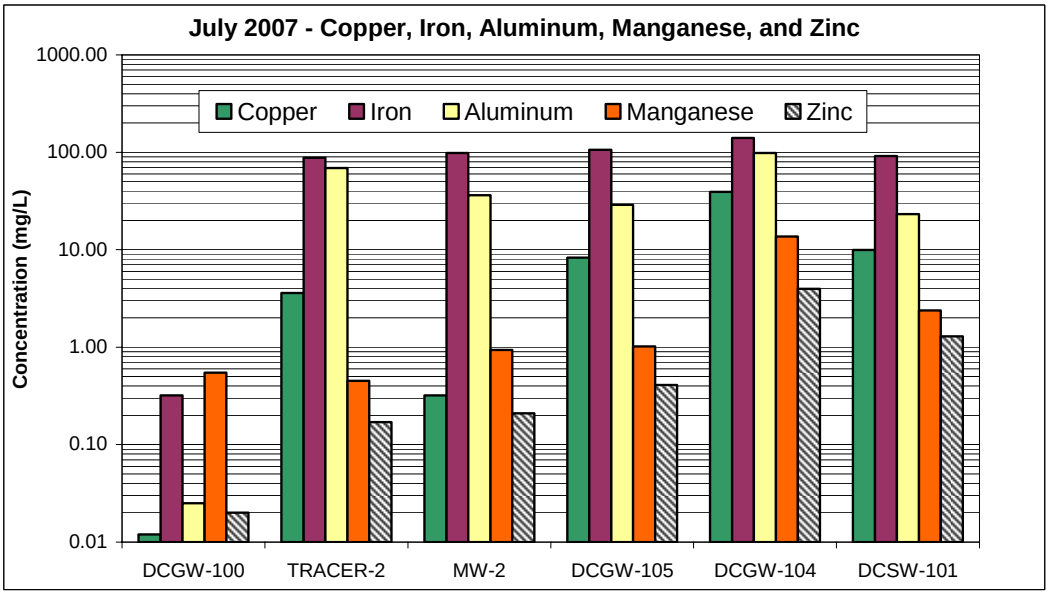


Figure 33. Comparison of Field Parameters and Analytical Data for Background Wells, Waste Rock Wells, and the McLaren Pit Subsurface Drain - July 2007 Data

The 2007 groundwater chemistry in wells Tracer 2 and MW-2 is consistent with previous years' monitoring and is considered background groundwater quality in the undisturbed Fisher Mountain Intrusive and Wolsey Shale formations in the McLaren Pit area. Groundwater in the vicinity of these wells is more mineralized and contains concentrations of copper, iron, and manganese that exceed human health standards and guidelines. Except for lower aluminum and copper concentrations in MW-2, representing the Wolsey Shale, groundwater quality is similar in these two wells with regard to pH, sulfate, iron, manganese, and zinc.

Well 105 is located near the uphill edge of the capped area and near the base of the bedrock highwall (**Figure 4**). Groundwater in this well exhibits similar acidity, sulfate, iron, and aluminum

concentrations as well Tracer 2 (Fisher Mountain Intrusive). Concentrations of copper, aluminum, manganese, and zinc are notably lower in well 105 than well 104. These differences are consistent with 2006 findings (Tetra Tech, 2007b). Consistent with previous results, well 104 contains the lowest pH, highest acidity, and highest concentrations of sulfate and metals (i.e. intercepts the poorest quality groundwater in the pit area (**Figures 32** and **33**). The lower metal concentrations in groundwater in the vicinity of well 105 compared with well 104 may be due to one or a combination of several factors: there is a relatively shorter amount of time that groundwater is in contact with the waste rock in the vicinity of well 105, there is a relatively greater contact time of groundwater with the waste rock in the vicinity of well 104, well 104 may be screened in waste rock containing a higher concentration of metals and sulfides than in the vicinity of well 105, and/or there may be groundwater recharge in the vicinity of well 104 that is sourced from bedrock with a greater metal and sulfide content.

Water quality in the highest flowing subsurface drain, DCSW-101 is also shown in **Figure 33**. Subsurface drain water quality has similarities with groundwater quality in well 105. Subsurface drain water quality also appears to have similar geochemistry to groundwater quality in wells Tracer 2 (Fisher Mountain Intrusive) and MW-2 (Wolsey Shale), except that the drain discharge has concentrations of copper, manganese, and zinc that are notably higher. The additional metals loading in the drain discharge may result from contact with waste rock in the McLaren Pit.

Figures 34 through 40 display the spatial relationships of pH, SC, sulfate, copper, iron, ORP, and DO in shallow colluvium in July 2007. These isopleth maps were originally prepared using 2002 data (Maxim 2003b) and then every year thereafter. The July 2007 data is shown as isopleth intervals that are colored to highlight the concentration ranges measured and inferred. The 2007 spatial interpretation (isopleth maps) of groundwater chemistry is similar to the isopleths maps prepared in 2002 through 2006 for the parameters shown. These maps show a plume of acidic and metals enriched groundwater below the McLaren Pit that has remained unchanged. The unwavering location of this plume over the years may be attributed to the mixing of poor quality groundwater from bedrock sources (Fisher Mountain Intrusive and Wolsey Shale) and McLaren Pit waste rock in the former pit area and subsequent flow directly downgradient toward Daisy Creek. Some of this groundwater may discharge as a line of ferricrete-forming springs below the most southern margin of the capped area (south and east of wells 111S/D) where the contact between the Wolsey Shale and Meagher Limestone outcrops (Tetra Tech, 2007b).

Another notable feature that has not changed since intensive monitoring downgradient of the McLaren Pit began in 2002 is the presence of a discrete zone of low pH groundwater centered around wells 108 and 101S. A hypothesis for the existence of this zone is that it is related to the Crown Butte Fault, which redirects a portion of acidic groundwater to this location from the main plume. Groundwater levels in wells 101S and 101D indicate an upward hydraulic gradient. Further west of wells 108 and 101S, groundwater quality improves substantially (as measured in wells 136 and 137). Groundwater quality east of the downgradient influence of the pit is also relatively un-impacted (as measured in well 138).

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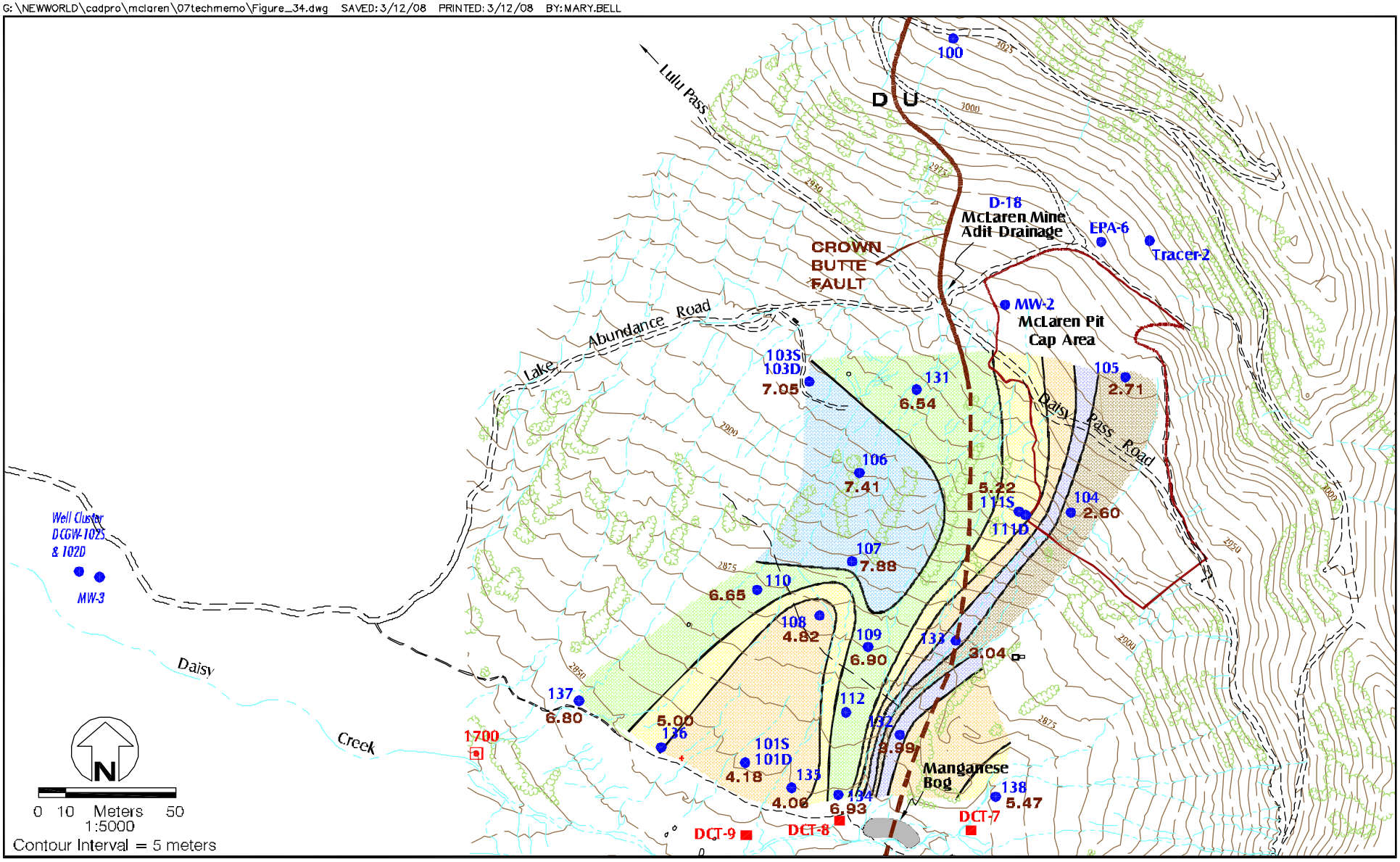

D U Crown Butte Fault
(D - down thrown; U - up thrown)
(dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

pH (Standard Units)

- <3
- 3-4
- 4-5
- 5-6
- 6-7
- >7

4.18 Measured pH in Well

7561506.110

Isopleth Map of pH
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 34

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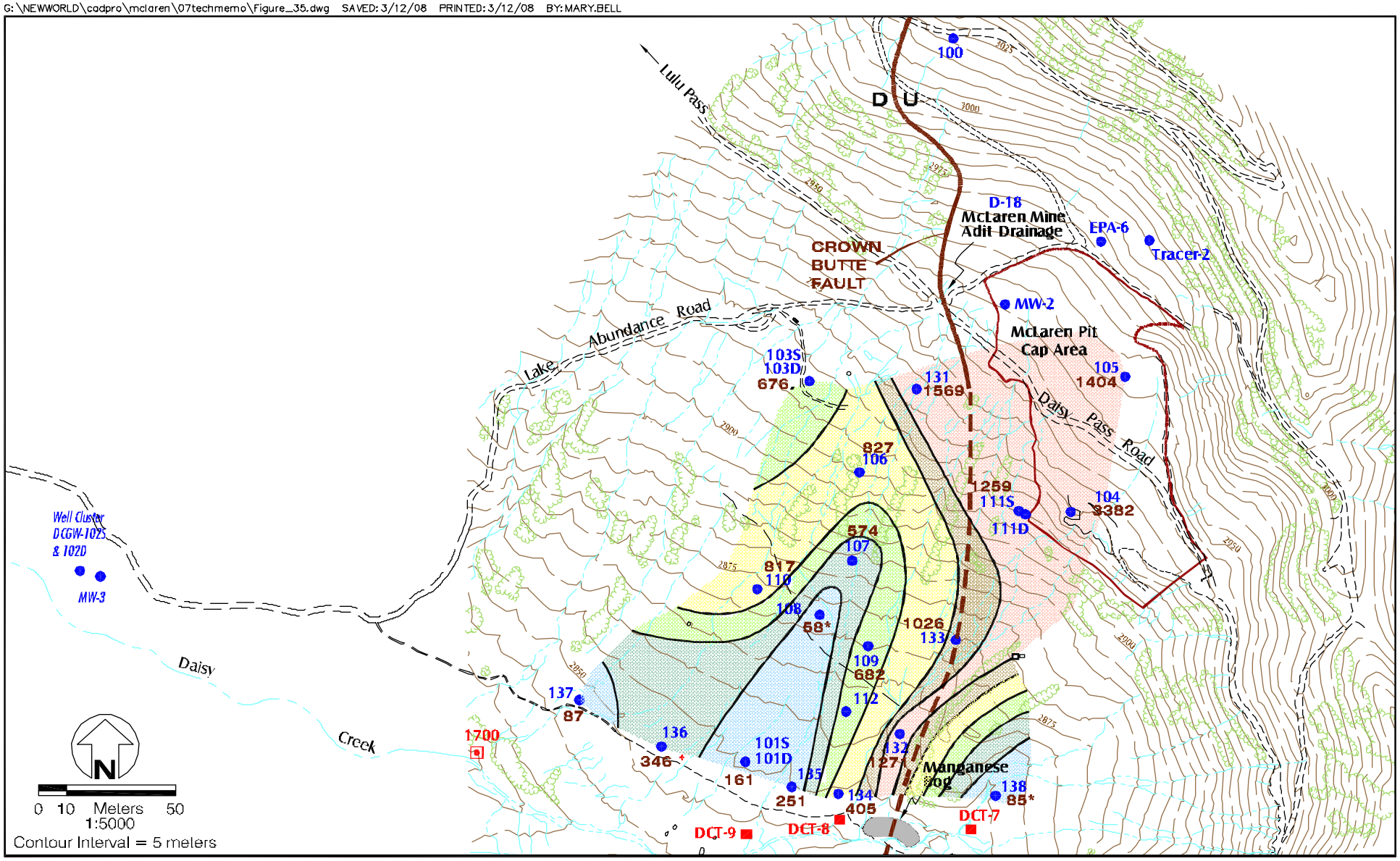

D U Crown Butte Fault
(D - down thrown; U - up thrown)
(dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

* Unstable Measurement

SC (micromhos per centimeter)

- <400
- 400-600
- 600-800
- 800-1000
- 1000-1200
- >1200

161 Measured Specific Conductance in Well

7561506.110

Isopleth Map of Specific Conductance
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 35

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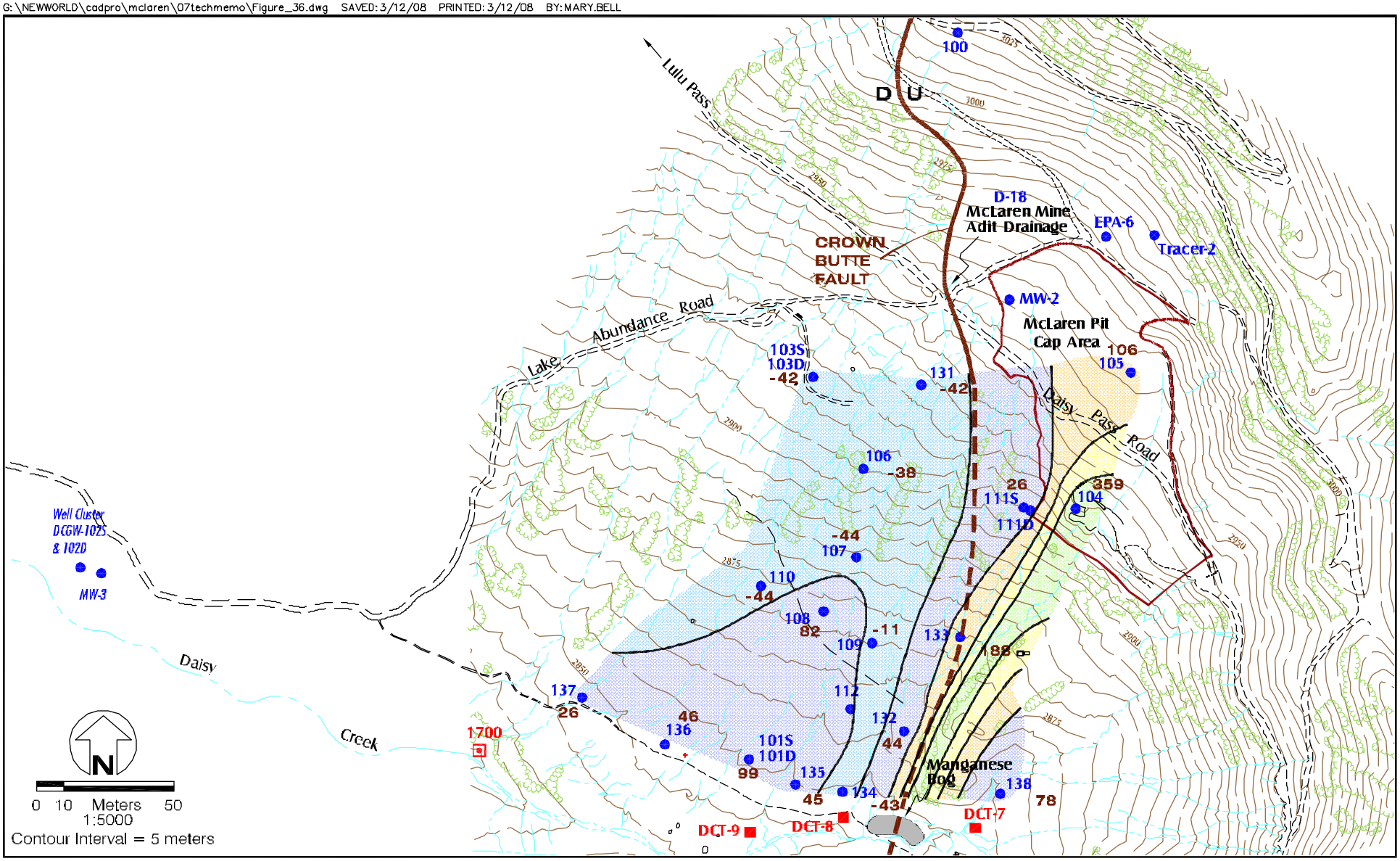

D U Crown Butte Fault (D - down thrown; U - up thrown) (dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

ORP (millivolts)

- -100-0
- 0-100
- 100-200
- 200-300
- 300-400
- >400

99 Measured Oxidation Reduction Potential in Well

7561506.110

Isopleth Map of Oxidation Reduction Potential
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 36

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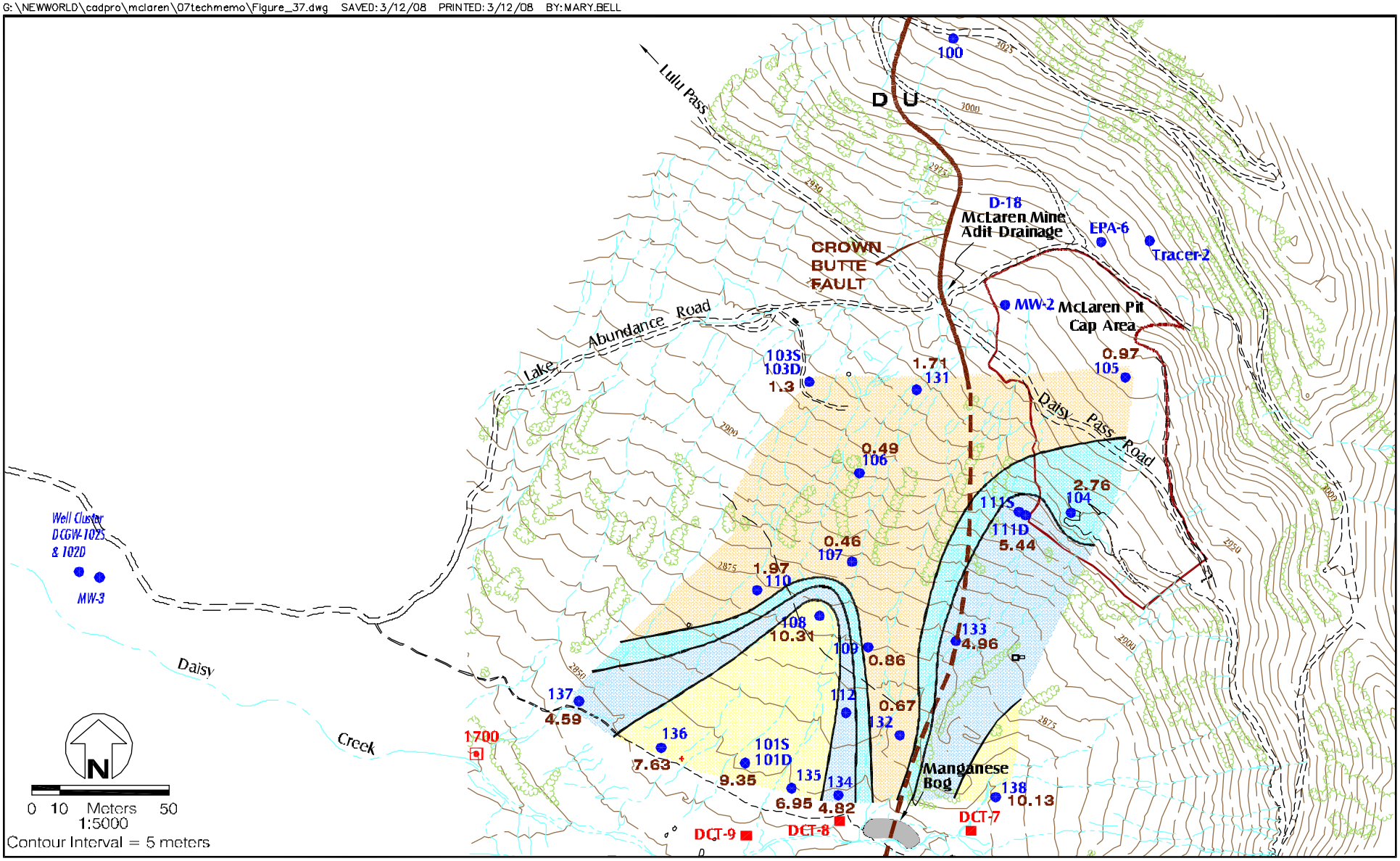

D U Crown Butte Fault
(D - down thrown; U - up thrown)
(dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

Dissolved Oxygen (milligrams/liter)

- <2
- 2-4
- 4-6
- >6

9.35 Measured Disolved Oxygen in Well

6561306.110

Isopleth Map of Dissolved Oxygen
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 37

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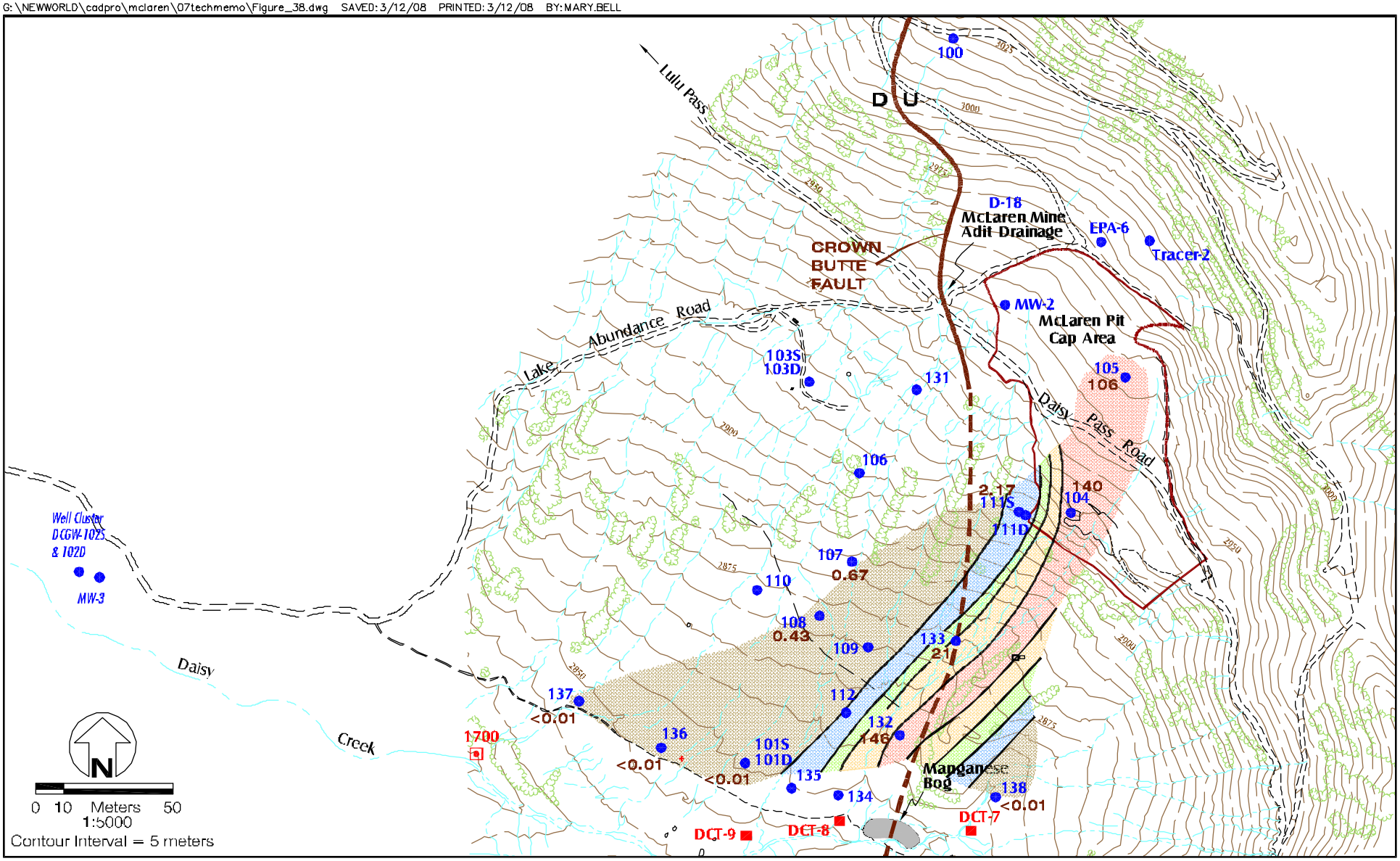

D U Crown Butte Fault
(D - down thrown; U - up thrown)
(dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

Dissolved Iron (milligrams/liter)

- <1
- 1-10
- 10-20
- 20-80
- >80

<0.01 Measured Dissolved Iron in Well

7561506.110

Isopleth Map of Dissolved Iron
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 38

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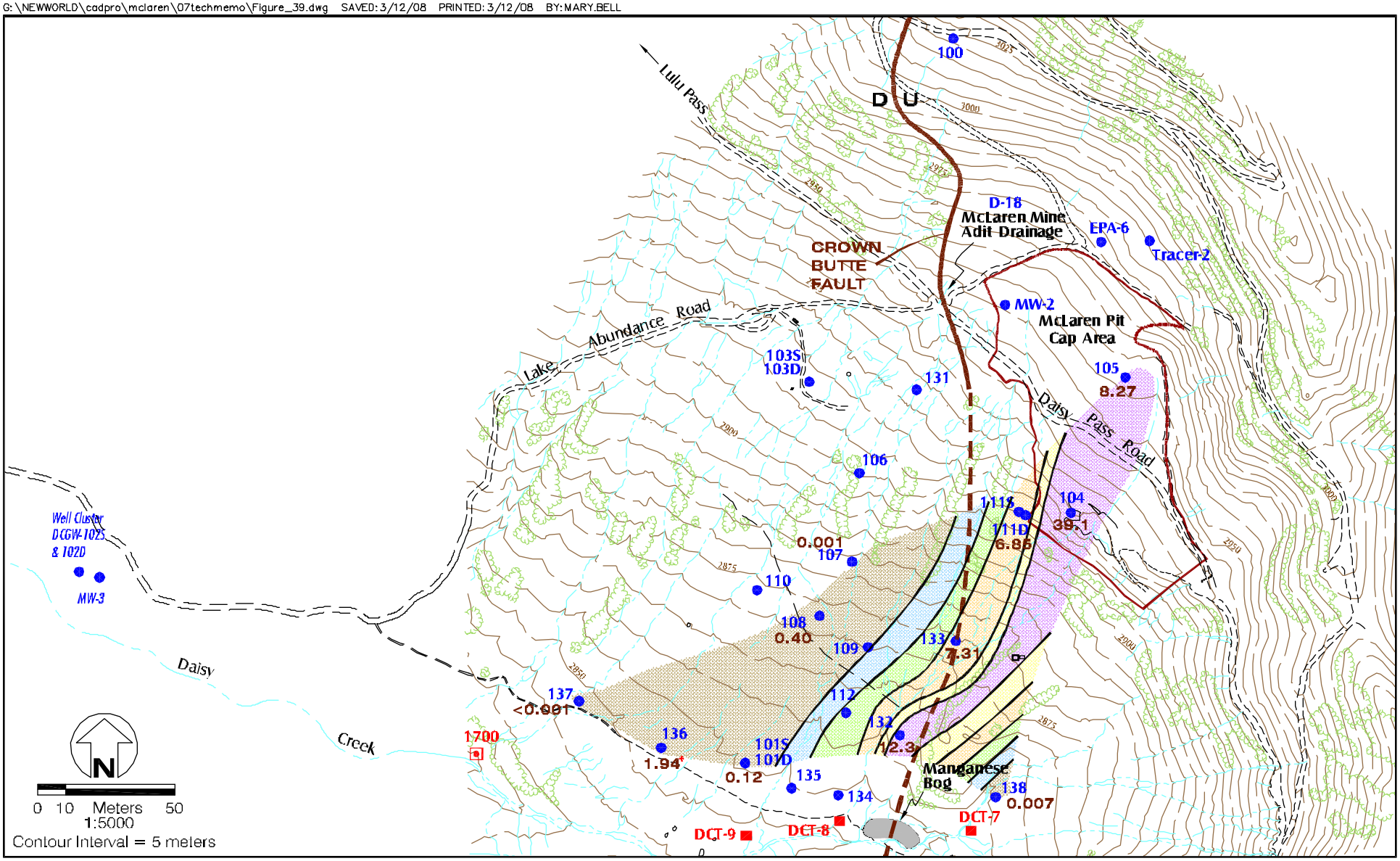

D U Crown Butte Fault
(D - down thrown; U - up thrown)
(dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

Dissolved Copper (milligrams/liter)

- <2
- 2-4
- 4-6
- 6-8
- 8-10
- >10

0.12 Measured Dissolved Copper in Well

7561506.110

Isopleth Map of Dissolved Copper
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 39

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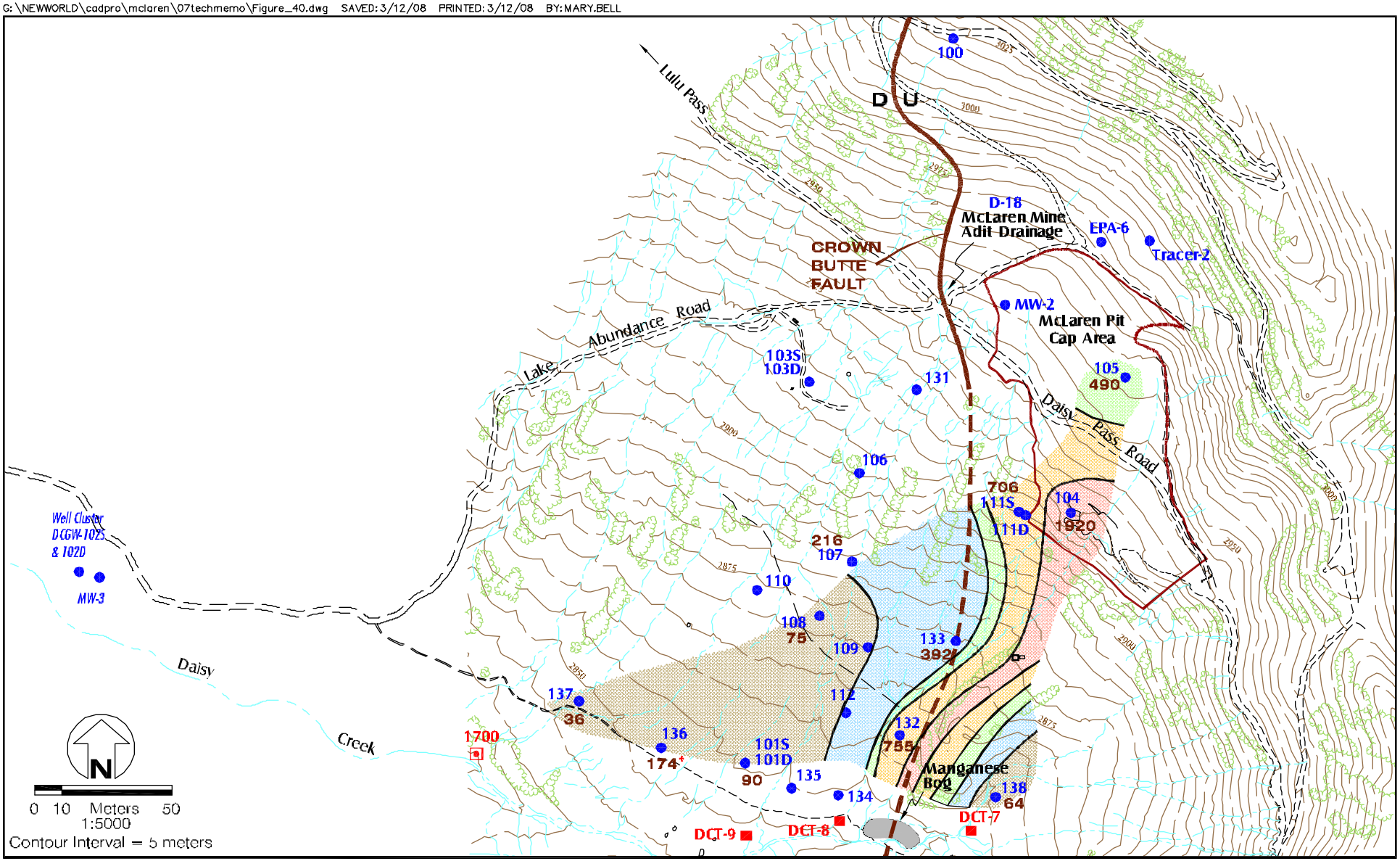

D U Crown Butte Fault (D - down thrown; U - up thrown) (dashed where inferred)

USGS 2000 Surface Water Site

Surface Water Station Monitored in 2007

101 Monitoring Well (DCGW prefix not included on 100 series wells)

Creek/Drainage

Road/Trail

Sulfate (milligrams/liter)

- <200
- 200-400
- 400-600
- 600-800
- >800

90 Measured Sulfate Concentration in Well

7561306.110

Isopleth Map of Sulfate
In Shallow Groundwater - July 2007
McLaren Pit Area
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 40

4.0 SUMMARY

Surface and groundwater monitoring conducted in 2007 indicates continued improvement in water quality in the Daisy Creek/Stillwater River and the Fisher Creek drainages. Water quality improvements can be attributed to recently implemented response actions that include capping and reclamation of the McLaren Pit area, closure (plugging) of the Glengarry Adit, and capping and reclamation activities in the Como Basin. Exceptions to improved water quality include McLaren Pit area groundwater quality, which remains relatively unchanged since 2002, and Como Basin surface water quality (at station FCT-11) that remains relatively unchanged, as well. A brief summary of the results is provided below.

4.1 DAISY CREEK AND STILLWATER RIVER DRAINAGE

Surface water quality in Daisy Creek and the Stillwater River has improved since the McLaren Pit Response Action was completed in October 2003. These improvements have been documented at even the most distal downstream station, SW-7, on the Stillwater River. At station SW-7, over the last four years, only total recoverable copper concentrations exceeded of the aquatic life standards. These exceedances occurred during high flow events (June) when suspended sediment is scoured and moves through the stream and in the subsequent low flow events (September/October) in 2004 and 2005.

For the most part, mean concentration values and loads of metals, in Daisy Creek, have declined since the capping of the McLaren Pit under both low and high flow conditions. The greatest changes have been manifest during high flow, when it is believed that a relatively greater amount of clean water moves off the McLaren Pit's impermeable cap during the snowmelt period in the spring and early summer, resulting in increased dilution of contaminants in Daisy Creek. Post-capping mean, low flow metals concentration values and loads are also lower at each of the Daisy Creek tributary (DCT-) and main stem (DC-) monitoring stations. This result is also attributed to the McLaren Pit cap that reduces or eliminates snowmelt and summer and fall precipitation from coming in contact with the metal and sulfide-rich waste rock.

The McLaren Pit subsurface drains contribute a significant percentage of the metals load to upper Daisy Creek (as measured at station DC-2) under both high and low flow conditions. These drains were installed during the McLaren Pit Response Action to provide outlets for springs discharging from bedrock in the area of the McLaren Pit highwall. The drains exhibit water quality characteristics that are very similar to background groundwater quality as measured in wells screened in bedrock unit's upgradient of the McLaren Pit. However, the drain discharge exhibits additional metals loading that is likely due to contact with metal and sulfide-rich waste rock under the cap.

Monitoring of groundwater quality in the McLaren Pit area indicates that conditions are similar to those observed during previous years. A plume of low pH, metal-enriched groundwater flows from the McLaren Pit, parallel to Daisy Creek tributary, DCT-8, toward Daisy Creek. The position and water quality of this plume has remained relatively unchanged for years. One hypothesis that explains existence of this plume is that poor quality groundwater from mineralized bedrock sources (Fisher Mountain Intrusive, Meagher Limestone, and Wolsey Shale) mix with groundwater in waste rock in the McLaren Pit area, and this combined

groundwater source flows directly downgradient toward Daisy Creek. Some of this water discharges as ferricrete-forming springs just below the southernmost margin of the capped area. Another distinctive groundwater feature identified by the analysis of groundwater from the monitoring well network, is the presence of a persistent zone of low pH groundwater centered around wells DCGW-108 and DCGW-101S. This zone is believed to be related to the trace of the Crown Butte Fault.

4.2 FISHER CREEK DRAINAGE

Surface water quality in Fisher Creek has improved since the Glengarry Adit Response Action was completed in September 2005. The improvement has been documented as far downstream as surface water station SW-4. Water quality data below station SW-4 to the confluence of the Clarks Fork of the Yellowstone River (as measured at station CFY-2) is similar to water quality data collected before closure of the Glengarry Adit. As was true in previous years, the copper concentration at station CFY-2 exceeds aquatic life standards during the high flow period (June). Similar to the Stillwater River, this is believed to be due to scouring of the streambed sediments that creates a suspended sediment load during the high flow period.

Water quality in upper Fisher Creek continues to be poor and acidic although metals concentrations, metal loads, and stream flow have been significantly reduced by closure of the Glengarry Adit. Post-closure stream flow at station SW-3 has been reduced by as much as 52% in comparison with pre-closure flow. Post-closure metal loads in upper Fisher Creek have been reduced by about 74% during low flow periods and 42% during high flow periods. At station SW-4, post-closure copper and iron concentrations have been at the lower portion of pre-closure concentration ranges as measured during comparable flow periods over the years.

4.3 MILLER CREEK AND SODA BUTTE CREEK

In lower Miller Creek, near its confluence with Soda Butte Creek (station SW-5), copper concentrations exceeded aquatic life standards during the high flow period (June). In upper Miller Creek (station SW-2), copper concentrations exceeded aquatic life standards during the low flow winter period (measured in April) and the high flow period (June). As documented in previous years, copper continues to be the only metal of concern in Miller Creek, with a potential source of copper being the mineralized slopes of Henderson Mountain that contain above normal concentrations of copper in the soil (Maxim, 2003c).

Results of monitoring in 2007 at the stations along Soda Butte Creek are similar with previous years results in that copper concentrations exceeded the chronic aquatic life standard during June (stations SBC-2 and SBSW-102) and iron concentrations exceeded the chronic aquatic life standard and human health guidelines in at least one of the three monitoring events. In addition, 2006 and 2007 monitoring results at station SBC-2 indicate water quality improvements to Soda Butte Creek resulting from upstream removal of the McLaren Mill site waste on NFS land in 2005.

4.4 NEW WORLD WASTE REPOSITORY

Fluids continue to accumulate in the repository sump following completion of the final cap in 2006. However, the rate of fluid accumulation appears to have decreased since cap

completion. In addition, only a slight increase in the fluid accumulation rate within the repository occurred during spring 2007. The two previous years of monitoring data show a distinct increase in the rate of fluid accumulation within the repository timed with a spring time rise in groundwater levels and Soda Butte Creek stream flow. Because of the lower rate of fluid accumulation, the sump only needed to be pumped once in 2007. This occurred in September when approximately 22,500 gallons of water was removed.

Water chemistry of the sump fluid is similar to that measured in previous years. Other than iron and manganese, all other metals in the sump fluid are at or near the PQL. Monitoring of the repository seep (flow less than 0.5 gpm), at the rock toe of the repository, indicated that metal concentrations had increased during 2006 and 2007 in comparison with the previous three years of monitoring.

Consistent with previous years, 2007 groundwater quality data from the monitoring well network around the repository did not indicate any impacts to groundwater from leakage of sump fluids. The 2007 surface water quality data from the two stations (SBT-3 and SBT-6) on the tributary to Soda Butte Creek, draining the repository area, indicated a slight improvement and no impacts from sump fluids.

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5.0 DATA VALIDATION

This section describes the data validation process used to determine the adequacy and quality of laboratory analytical data collected for surface water and groundwater monitoring conducted in 2007. The objective of data validation is to identify any unreliable or invalid measurements and qualify that data for interpretive use. Data validation was performed according to guidelines established by the EPA (1994).

5.1 SURFACE WATER DATA VALIDATION

The 2007 surface water monitoring events were validated independently as separate sample matrices. Data qualifiers used to flag data are as follows: '<' indicates the material was analyzed for but not detected above the level of the associated value practical quantitation limit (PQL); 'J' indicates the associated values are an estimated quantity; and, 'R' indicates the data are rejected or unacceptable.

5.1.1 Field QA/QC

During 2007, field duplicates were prepared and containerized by Tetra Tech field personnel in accordance with the Site-Wide SAP (Maxim, 1999b). Field Quality Assurance/Quality Control (QA/QC) samples collected/prepared during the 2007 surface water monitoring events are summarized in **Table 16**.

TABLE 16
2007 SURFACE WATER QA/QC SAMPLES
New World Mining District Response and Restoration Project

Monitoring Event	QA/QC Sample	Sample Designation
April 5, 2007	Field Duplicate	SBT-6X
April 11, 2007	Field Duplicate	SW-4X
June 12, 2007	Field Duplicate	SW-3X
August 20, 2007	Field Duplicate	M-1X
September 18, 2007	Field Duplicate	DCT-8X

Field duplicate results aid in the assessment of sampling and analytical accuracy. Analytical results for the original and duplicate samples collected from each sampling event were evaluated using relative percent difference (RPD) and absolute value difference (AVD). The RPD between the two samples was calculated when both values of the natural/duplicate pair were greater than five times the PQL for a given analyte. The AVD between the natural and duplicate sample for a given analyte was calculated when one or both values were less than five times the PQL.

RPDs are calculated by dividing the difference between the two reported values for a given parameter by the average of the two parameters. Analytical results of parameters where the

RPD was greater than 20 percent are considered estimated concentrations. Total recoverable copper in the natural/field duplicate pair M-1/M-1-X exhibited an RPD greater than 20 percent for the August 20, 2007 sampling event. Therefore, all total recoverable copper results are flagged as estimated for this event. No other parameters exhibited an RPD greater than 20 percent in the 2007 sampling events.

Results from natural/duplicate pairs with values less than five times the PQL are considered estimated when the absolute value difference exceeds the PQL. No parameters exhibited an AVD greater than the PQL in the 2007 sampling events.

5.1.2 Laboratory QA/QC

In 2007, Northern Analytical Laboratories received surface water samples from Tetra Tech on the following dates: April 6, April 12, May 18, June 15, July 20, August 22, and September 21. All samples arrived at the laboratory within the required temperature range and were analyzed within the required holding time for the parameters of interest with the following exceptions:

- Sulfate analysis was performed past the required holding time for samples DCT-8, DCSW-101, DCSW-102, and DCSW-103 collected July 18, 2007.
- Acidity analysis was performed past the required holding time for sample MCSI-96-3 collected August 20, 2007.
- Total Alkalinity and Bicarbonate Alkalinity analyses were performed past the required holding time for sample M-8 collected August 20, 2007.
- Total Alkalinity, Carbonate Alkalinity, and Bicarbonate Alkalinity analyses were performed past the required holding time for sample FCSI-99-1 collected August 20, 2007.

Northern Analytical Laboratories reviewed the majority of the analytical data, set the calibration standards, verified calibration, implemented laboratory controls, and analyzed laboratory duplicates and laboratory spikes on a daily basis. When data did not meet NAL's QA/QC criteria and precision and accuracy guidelines as specified in NAL's *Laboratory Quality Assurance Plan* (submitted to MDEQ, June 1997), then the data were flagged and appropriately qualified by the laboratory. One total recoverable iron result was flagged (SW-2 on June 14, 2007) due to blank contamination.

Accuracy is measured as the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. Accuracy acceptance or rejection is based on the percent recovery (%R) of the laboratory matrix spike for water samples. To determine accuracy, the %R for each matrix spike is compared to the acceptable range as specified in the applicable laboratory method. Natural results associated with percent recoveries outside acceptable limits are considered estimated. Natural results associated with percent recoveries of less than 50 percent are considered rejected, as recommended by U.S. EPA (1988). Under this criterion, some of the data was qualified but no data was rejected. Estimated natural results and other data qualifiers are detailed in laboratory reports contained in **Appendix D**.

5.1.3 Data Completeness

No surface water data were rejected on the basis of field QA/QC or laboratory QA/QC for the 2007 sampling event. Sampling frequency and locations were in general accordance with the Site-Wide SAP and the work plan prepared for the 2007 sampling event. Therefore, a data completeness of 100 percent was achieved for the 2007 surface water monitoring events.

5.2 GROUNDWATER DATA VALIDATION

The 2007 groundwater monitoring event was validated independently as a separate sample matrix. Data flagging conventions are the same as that used for surface water samples.

5.2.1 Field QA/QC

During 2007, field duplicates and rinsate blanks were prepared and containerized by Tetra Tech field personnel in accordance with the Site-Wide SAP (Maxim, 1999b). Field QA/QC samples collected/prepared during the 2007 groundwater monitoring events are summarized in **Table 17**.

TABLE 17
2007 GROUNDWATER QA/QC SAMPLES
New World Mining District Response and Restoration Project

Monitoring Event	QA/QC Sample	Sample Designation
May 16, 2007	Field Duplicate	Repository Sump X
June 26, 2007	Field Duplicate	SBGW-107TX
July 17, 2007	Field Duplicate	EPA-11X
July 17, 2007	Rinsate Blank	EPA-11R
July 23, 2007	Field Duplicate	MW-1X

Analytical results of parameters where the RPD was greater than 20 percent are considered estimated concentrations. No parameters exhibited an RPD greater than 20 percent in the 2007 sampling events.

Results from natural/duplicate pairs with values less than five times the PQL are considered estimated when the absolute value difference (AVD) exceeds the PQL. No parameters exhibited an AVD greater than the PQL in the 2007 sampling events.

The rinsate blank (EPA-11R) was collected while using the submersible Redi-flow pump to sample wells EPA-11 and EPA-12 on July 17, 2007. The blank was collected and evaluated to determine if any parameters were measured in the samples at detectable concentrations. Any result greater than or equal to the PQL but less than five times the concentration of a blank contaminate are considered estimated and are likely biased towards the high end. Based on the analytical results of the blank, no natural sample results are considered estimated.

5.2.2 Laboratory QA/QC

In 2007, Northern Analytical Laboratories received groundwater samples from Tetra Tech on the following dates: May 18, June 27, July 20, July 26, and August 22. All samples arrived at the laboratory within the required temperature range and were analyzed within the required holding time for the parameters of interest with the following exception:

- Sulfate analysis was performed past the required holding time for samples DCGW-132, DCGW-133, and DCGW-105 collected July 19, 2007.

Northern Analytical Laboratories reviewed the majority of the groundwater analytical data, calibration standards, calibration verification, laboratory controls, laboratory duplicates, and laboratory spikes on a daily basis. When data did not meet NAL's QA/QC criteria and precision and accuracy guidelines as specified in NAL's *Laboratory Quality Assurance Plan* (submitted to MDEQ, June 1997), then the data were flagged and appropriately qualified by the laboratory.

Accuracy is measured as the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample. Accuracy acceptance or rejection is based on the percent recovery (%R) of the laboratory matrix spike for water samples. To determine accuracy, the %R for each matrix spike is compared to the acceptable range as specified in the applicable laboratory method. Natural results associated with percent recoveries outside acceptable limits are considered estimated. Natural results associated with percent recoveries of less than 50 percent are considered rejected, as recommended by U.S. EPA (1988). Under this criterion, no data were qualified with the exception of the dissolved iron concentration of well Tracer 2 on July 19, 2007 (flagged as estimated) and all groundwater data collected in 2007 are acceptable. Other data qualifiers are detailed in laboratory reports contained in **Appendix D.**

5.2.3 Data Completeness

No groundwater data were rejected on the basis of field QA/QC or laboratory QA/QC for the 2007 sampling event. Sampling frequency and locations were in general accordance with the Site-Wide SAP and the work plan prepared for the 2007 sampling events. Therefore, a data completeness of 100 percent was achieved for the 2007 groundwater monitoring events.

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APPENDIX A

2007 SURFACE WATER DATA
2007 SURFACE WATER AND GROUNDWATER MONITORING

New World Mining District Response and Restoration Project

APPENDIX A-1

2007 Surface Water Summary

TABLE A-1
2007 SURFACE WATER SUMMARY
NEW WORLD MINING DISTRICT RESPONSE AND RESTORATION PROJECT

Station Name	Sample Date	Flow Rate (cfs)	Anions (mg/L)					Cations (mg/L)								Metals (mg/L)													
			Acididity as CaCO3	Alkalinity as HCO3	Alkalinity as Total CaCO3	Chloride	Sulfate	Calcium	Hardness as CaCO3	Magnesium	Potassium	Sodium	Field SC (umhos/cm)	Field pH (s.u.)	Total Suspended Solids (mg/L)	Aluminum Total Recoverable	Aluminum Dissolved	Cadmium Total Recoverable	Cadmium Dissolved	Copper Total Recoverable	Copper Dissolved	Iron Total Recoverable	Iron Dissolved	Lead Total Recoverable	Lead Dissolved	Manganese Total Recoverable	Manganese Dissolved	Zinc Total Recoverable	Zinc Dissolved
Drainage: Adits																													
D-18	8/20/2007	0.01	3	35	29	5	389	139	424	24	4	5	1035	6.73	37	0.7	<0.05	<0.0001	<0.0001	JF%0.044	0.002	34	25.3	0.004	<0.001	1.24	1.09	0.09	0.07
D-18	9/18/2007	0.0107	<1	31	25	<1	395	137	436	23	3	5	915	6.28	34	0.17	<0.05	<0.0001	<0.0001	0.02	0.002	29.3	23.1	<0.001	<0.001	1.13	1.14	0.08	0.07
F-28	6/12/2007	0.054	<5	49	40	<1	145	52	64	15	<1	3	303	6.6	<1	<0.05	--	<0.0001	--	0.002	--	0.45	--	<0.001	--	0.03	--	<0.01	--
F-28	8/20/2007	0.01	<1	134	109	<1	266	105	388	30	2	10	884	7.59	5	0.08	<0.05	<0.0001	<0.0001	JF%0.003	<0.001	0.42	0.06	0.002	<0.001	0.093	0.082	0.02	<0.01
F-28	9/17/2007	0.0086	<1	145	119	<1	289	112	411	31	2	11	854	7.14	1	<0.05	<0.05	<0.0001	<0.0001	0.002	<0.001	0.22	0.06	<0.001	<0.001	0.079	0.087	<0.01	0.01
F-8A	6/12/2007	--	<5	49	40	<1	96	41	131	7	2	6	243	6.9	38	1.01	--	0.0003	--	0.39	--	23.6	--	0.005	--	0.63	--	0.09	--
F-8B	8/20/2007	0.0025	37	<1	<1	<1	91	12	44	4	2	7	357	3.56	77	0.31	0.19	0.0002	0.0001	JF%0.097	0.072	41	8.63	0.002	<0.001	1.13	1.05	0.13	0.12
F-8B	9/17/2007	0.0039	31	<1	<1	<1	88	11	44	3	2	7	728	3.41	3	0.19	0.22	0.0001	0.0001	0.07	0.065	7.46	7.28	<0.001	<0.001	1.1	1.09	0.11	0.12
FCSI-96-5	8/20/2007	0.004	<1	60	49	<1	45	25	99	9	1	2	238	6.76	16	0.29	<0.05	0.0003	0.0001	JF%0.008	0.001	0.62	<0.01	0.003	<0.001	0.27	0.09	0.06	0.03
FCSI-96-5	9/17/2007	0.0006	<1	64	52	<1	45	26	99	9	1	2	221	6.74	68	0.16	0.12	0.0002	<0.0001	0.005	<0.001	0.43	<0.01	0.003	<0.001	0.2	0.089	0.04	0.02
FCSI-99-1	8/20/2007	0.0001	<1	90	74	<1	66	48	151	10	1	2	322	8.29	69	1.36	<0.05	0.0014	<0.0001	JF%0.21	0.002	7.15	<0.01	0.3	<0.001	0.29	<0.003	0.22	<0.01
FCSI-99-1	9/17/2007	0.000006	<1	114	93	<1	82	57	187	12	1	2	562	7.26	J21	0.11	<0.05	0.0002	0.0001	0.013	0.001	0.43	<0.01	0.009	<0.001	0.026	<0.003	0.04	0.04
M-1	8/20/2007	0.014	<1	195	160	<1	425	168	633	57	2	5	1232	6.52	17	0.33	<0.05	0.0004	0.0003	JF%0.051	<0.001	13.4	10.8	0.15	<0.001	2.42	2.21	0.18	0.13
M-1	9/18/2007	0.0123	<1	217	178	<1	393	152	624	52	2	5	1102	7.35	13	<0.05	<0.05	0.0001	0.0001	0.004	0.002	3.53	3.02	0.001	<0.001	1.52	1.54	0.06	0.07
M-1X	8/20/2007	--	<1	203	166	<1	425	169	638	58	2	5	--	--	15	0.4	<0.05	0.0005	0.0003	0.065	<0.001	14	10.8	0.16	<0.001	2.47	2.24	0.18	0.13
M-25	8/20/2007	<0.0001	<1	20	17	<1	39	16	54	4	2	2	177	7.05	20	0.15	<0.05	0.0013	0.0012	JF%0.46	0.33	0.34	<0.01	0.051	0.007	0.024	0.018	0.17	0.14
M-8	8/20/2007	0.0002	<1	139	114	1	50	71	170	16	7	<1	450	7.54	956	16.3	<0.05	0.0047	0.0015	JF%0.041	<0.001	19.8	<0.01	0.2	<0.001	0.54	<0.003	1.21	0.33
M-8	9/18/2007	0.0006	<1	153	125	<1	66	90	201	33	15	1	376	7.14	1230	57.9	<0.05	0.011	0.0004	0.16	<0.001	83.5	<0.01	1.36	<0.001	2.06	<0.003	2.96	0.07
MCSI-96-3	8/20/2007	0.0001	<1	71	58	<1	30	39	90	6	5	1	301	6.46	1800	10.4	<0.05	0.0046	0.0007	JF%0.03	<0.001	19.1	<0.01	0.61	<0.001	0.88	<0.003	0.96	0.22
MCSI-96-3	9/18/2007	0.0006	<1	70	57	<1	33	37	99	6	5	<1	228	5.93	53	9.5	<0.05	0.0093	0.0007	0.03	<0.001	16.4	<0.01	0.36	<0.001	3.64	0.013	1.48	0.26
Drainage: Clarks Fork																													
SW-6	4/11/2007	4.04	<5	29	23	<1	7	9	31	2	<1	1	57	6.93	<5	<0.05	<0.05	<0.0001	<0.0001	0.002	0.002	<0.01	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SW-6	6/12/2007	101	<5	19	15	<1	10	6	19	1	<1	<1	35	7.3	<2	0.07	<0.05	<0.0001	<0.0001	0.018	0.01	0.08	0.01	<0.001	<0.001	<0.003	0.004	<0.01	<0.01
SW-6	9/17/2007	1.9	<1	33	27	<1	22	14	47	3	<1	2	104	7.09	4	<0.05	<0.05	<0.0001	<0.0001	0.003	0.002	<0.01	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
Drainage: Daisy Creek / Stillwater River																													
DC-2	4/11/2007	0.05	40	<1	<1	2	292	63	211	13	1	2	473	6.93	18	8.3	--	0.0036	--	1.44	--	12	--	0.003	--	1.76	--	0.46	--
DC-2	6/13/2007	10.2	<5	11	9	<1	53	19	64	4	1	<1	121	7.1	41	3.7	--	0.0004	--	0.41	--	5.36	--	0.009	--	0.23	--	0.07	--
DC-2	7/18/2007	0.507	58	<1	<1	<1	197	47	167	12	1	2	387	4.72	28	8.9	--	0.0023	--	2.2	--	10.2	--	0.002	--	1.12	--	0.34	--
DC-2	9/18/2007	0.154	96	<1	<1	1	366	75	270	20	2	3	699	4.15	23	13.4	--	0.0042	--	3.58	--	12.9	--	0.004	--	2.37	--	0.61	--
DC-5	4/11/2007	0.432	<5	76	62	<1	96	48	156	10	<1	1	283	6.93	9	1.23	<0.05	0.0007	0.0006	0.25	0.026	1.03	<0.01	<0.001	<0.001	0.32	0.34	0.09	0.05
DC-5	6/13/2007	30.7	<5	43	35	<1	27	19	55	4	<1	<1	117	5.7	20	1.39	<0.05	0.0002	0.0001	0.019	0.02	1.73	0.06	0.003	<0.001	0.099	0.072	0.02	<0.01
DC-5	9/18/2007	0.418	<1	35	29	1	173	60	207	13	1	2	449	6.92	39	4.23	<0.05	0.0014	0.001	1.16	0.018	5.04	<0.01	0.002	<0.001	0.74	0.74	0.22	0.07
DCSW-101	7/18/2007	0.037	350	<1	<1	1	450	27	104	9	2	3	1021	2.8	30	23.3	--	0.0069	--	9.91	--	91.6	--	0.007	--	2.38	--	1.29	--
DCSW-101	9/18/2007	0.0088	417	<1	<1	1	607	40	155	14	2	3	1134	3.04	7	25.4	24.8	0.01	0.0099	12.6	11.7	133	130	0.006	0.005	3.34	3.33	1.77	1.74
DCSW-102	6/13/2007	0.052	665	<1	<1	1	875	63	244	20	2	3	1733	2.8	<4	31.4	31.1	0.019	0.019	16.4	16.2	163	155	0.004	0.003	4.88	3.93	3.49	3.03
DCSW-102	7/18/2007	0.011	455	<1	<1	1	595	40	162	15	1	3	1522	2.59	<1	24.3	--	0.011	--	13.3	--	96.3	--	0.001	--	3.54	--	1.98	--
DCSW-102	9/18/2007	0.00004	565	<1	<1	2	828	52	235	24	<1	3	1704	2.65	<1	27.1	26	0.012	0.012	16.2	15.4	132	127	0.002	0.002	4.38	4.34	2.13	2.13
DCSW-103	7/18/2007	0.003	1260	<1	<1	1	1760	113	570	70	<1	5	2674	2.44	<1	76.1	--	0.022	--	30.4	--	316	--	J0.003	--	10.7	--	4.07	--
DCSW-103	9/18/2007	0.0015	1360	<1	<1	3	2220	117	686	84	<1	5	2940	2.59	<2	87.9	88.1	0.023	0.023	29.8	29.1	374	358	0.004	0.004	12.7	13.2	4.09	4.22
DCT-7	7/18/2007	0.047	<5	56	46	<1	77	43	120	4	1	1	247	6.65	<2	<0.05	<0.05	0.0006	0.0005	0.059	0.049	<0.01	<0.01	<0.001	<0.001	0.091	0.083	0.08	0.07
DCT-7	9/18/2007	0.0172	<1	64	52	<1	125	64	189	7	1	2	389	7	2	0.11	0.06	0.0006	0.0006	0.071	0.064	0.09	<0.01	0.001	<0.001	0.14	0.13	0.08	0.09

Notes:

cfs - Cubic feet per second
s.u. - Standard units
mg/L - Milligrams per liter
X - Field duplicate
umhos/cm - micromhos per centimeter

-- - Indicates data not collected, parameter not analyzed, or not applicable
< - Indicates analyte not detected above practical quantitation limit (PQL)
J - The associated value is an estimated quantity
JB - The analyte was detected in the method blank. Sample concentration may not represent true concentration.
JF% - The associated values are estimated quantities because field duplicate results exceed acceptable limits by relative percent difference determination
Flow Rate - Some of the flow rates shown have been converted from gallons per minute (gpm) to cubic feet per second (cfs). Please refer to original field notes for exact values.

TABLE A-1
2007 SURFACE WATER SUMMARY
NEW WORLD MINING DISTRICT RESPONSE AND RESTORATION PROJECT

Station Name	Sample Date	Flow Rate (cfs)	Anions (mg/L)					Cations (mg/L)								Metals (mg/L)													
			Acididity as CaCO3	Alkalinity as HCO3	Alkalinity as Total CaCO3	Chloride	Sulfate	Calcium	Hardness as CaCO3	Magnesium	Potassium	Sodium	Field SC (umhos/cm)	Field pH (s.u.)	Total Suspended Solids (mg/L)	Aluminum Total Recoverable	Aluminum Dissolved	Cadmium Total Recoverable	Cadmium Dissolved	Copper Total Recoverable	Copper Dissolved	Iron Total Recoverable	Iron Dissolved	Lead Total Recoverable	Lead Dissolved	Manganese Total Recoverable	Manganese Dissolved	Zinc Total Recoverable	Zinc Dissolved
DCT-8	6/13/2007	1.55	57	<1	<1	1	140	30	81	4	4	1	317	4	23	6.4	4.76	0.0015	0.0014	1.6	1.42	11.1	5.04	0.002	0.001	0.5	0.44	0.2	0.19
DCT-8	7/18/2007	0.104	301	<1	<1	2	454	45	165	12	3	3	1059	2.81	<1	28	27.2	0.0055	0.0054	6.77	6.87	37.1	35.5	0.005	0.006	2.34	2.29	0.89	0.82
DCT-8X	9/18/2007	--	365	<1	<1	2	671	78	301	22	3	4	--	--	<1	32.2	32.2	0.0091	0.0091	9.92	9.37	50.3	49.4	0.006	0.006	4.32	4.41	1.41	1.42
DCT-8	9/18/2007	0.051	359	<1	<1	2	669	82	299	23	4	5	1453	2.92	<1	33.9	32	0.0096	0.0091	10.2	9.38	52.9	48.9	0.006	0.006	4.49	4.39	1.46	1.43
DCT-9	7/18/2007	0.006	68	<1	<1	1	150	30	96	5	3	3	409	3.31	11	7.03	6.8	0.0008	0.0008	0.66	0.66	0.15	0.16	0.004	0.004	0.37	0.36	0.1	0.09
DCT-9	9/18/2007	0.003	91	<1	<1	1	230	48	144	7	4	5	588	3.37	<1	12.2	11.5	0.001	0.001	0.92	0.82	0.35	0.3	0.005	0.005	0.61	0.58	0.14	0.14
SW-7	4/11/2007	1.89	<5	105	86	<1	17	34	102	7	<1	1	185	6.93	<5	<0.05	<0.05	<0.0001	<0.0001	0.002	0.001	0.19	0.05	<0.001	<0.001	0.018	0.018	<0.01	<0.01
SW-7	6/13/2007	81	<5	79	65	<1	10	23	71	5	<1	1	49	7.3	3	0.25	<0.05	<0.0001	<0.0001	0.041	0.009	0.31	0.01	<0.001	<0.001	0.012	0.016	<0.01	<0.01
SW-7	9/18/2007	2.51	<1	110	90	<1	27	35	121	7	<1	2	244	6.9	<2	0.11	<0.05	<0.0001	<0.0001	0.007	0.002	0.16	<0.01	<0.001	<0.001	0.024	0.02	<0.01	<0.01
USGS-11890	9/18/2007	1.39	<1	78	64	<1	65	38	137	9	<1	2	265	7.49	13	1.73	<0.05	0.0005	0.0003	0.41	0.007	3.2	<0.01	0.001	<0.001	0.26	0.25	0.08	0.01
USGS-1700	6/13/2007	1.07	13	<1	<1	1	52	17	48	3	<1	<1	104	6	33	2.3	0.4	0.0003	0.0002	0.25	0.15	4.95	0.1	0.003	<0.001	0.19	0.14	0.02	0.02
USGS-1700	9/18/2007	0.0014	6	5	4	<1	152	50	159	7	<1	2	409	5.76	18	2.1	0.13	0.0013	0.0012	0.36	0.3	0.08	<0.01	0.018	0.011	0.7	0.73	0.14	0.14
Drainage: Fisher Creek																													
CFY-2	4/11/2007	0.837	<5	17	14	1	29	13	42	3	<1	1	84	6.57	<5	<0.05	<0.05	<0.0001	<0.0001	0.005	0.005	<0.01	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
CFY-2	6/12/2007	43.4	<5	11	9	1	18	10	33	2	<1	<1	56	6.3	2	0.14	<0.05	<0.0001	<0.0001	0.04	0.019	0.13	0.02	<0.001	<0.001	0.01	0.012	<0.01	<0.01
CFY-2	9/17/2007	0.915	<1	18	15	<1	35	15	54	3	<1	2	123	6.87	1	<0.05	<0.05	<0.0001	<0.0001	0.008	0.005	0.01	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	0.01
FC-4	9/17/2007	0.426	16	<1	<1	<1	55	12	42	3	1	3	141	4.32	2	1.11	1.14	0.0004	0.0004	0.36	0.35	0.35	0.21	<0.001	<0.001	0.28	0.3	0.06	0.07
FCT-11	6/12/2007	0.567	<5	19	15	6	59	21	60	4	16	4	175	6.9	26	1.73	0.07	0.0002	0.0001	0.5	0.21	2.78	1.13	<0.001	<0.001	0.28	0.25	0.02	0.02
FCT-11	9/17/2007	0.212	130	<1	<1	3	395	70	257	20	4	4	940	3.07	23	5.93	5.75	0.0007	0.0007	0.68	0.65	38.1	35.6	0.002	0.002	3.06	3.19	0.33	0.34
FCT-12	6/12/2007	--	15	<1	<1	<1	15	2	5	<1	<1	1	36	4.7	<1	1.21	1.06	0.0001	0.0001	0.57	0.53	0.1	0.05	0.002	0.001	0.039	0.039	0.02	0.02
FCT-12	9/17/2007	0.0073	14	<1	<1	<1	33	4	10	<1	<1	4	142	4.08	<1	1.28	1.25	0.0006	0.0006	0.72	0.66	0.02	<0.01	0.008	0.009	0.17	0.18	0.09	0.1
SW-3	4/11/2007	0.065	26	<1	<1	2	81	16	56	4	2	4	207	5	<5	2.14	--	0.001	--	0.75	--	0.87	--	0.001	--	0.45	--	0.14	--
SW-3X	6/12/2007	--	9	2	1	2	32	10	33	2	4	2	--	--	19	1.74	--	0.0002	--	0.3	--	2.64	--	0.002	--	0.13	--	0.02	--
SW-3	6/12/2007	6.94	13	2	1	2	32	9	31	2	3	2	71	7	21	1.72	--	0.0002	--	0.32	--	2.46	--	0.002	--	0.13	--	0.01	--
SW-3	9/17/2007	0.142	24	<1	<1	<1	88	18	62	4	2	4	372	3.85	2	2.51	--	0.0008	--	0.84	--	1.26	--	0.002	--	0.57	--	0.12	--
SW-4	4/11/2007	0.582	<5	11	9	2	39	14	45	3	<1	2	108	6.58	<5	<0.05	<0.05	0.0002	0.0002	0.038	0.031	0.02	<0.01	<0.001	<0.001	0.014	0.012	0.04	0.04
SW-4X	4/11/2007	--	<5	11	9	<1	41	14	45	3	<1	2	--	--	<5	0.06	<0.05	0.0002	0.0002	0.039	0.031	0.03	<0.01	<0.001	<0.001	0.014	0.012	0.03	0.04
SW-4	6/12/2007	46.7	<5	14	11	<1	21	10	31	2	<1	<1	58	6.9	4	0.3	<0.05	<0.0001	<0.0001	0.069	0.026	0.27	0.02	<0.001	<0.001	0.02	0.019	<0.01	<0.01
SW-4	9/17/2007	0.88	<1	10	8	<1	48	16	59	4	<1	2	140	6.91	2	0.07	<0.05	0.0002	0.0002	0.044	0.032	0.05	<0.01	<0.001	<0.001	0.033	0.033	0.02	0.03
Drainage: Miller Creek																													
SW-2	4/11/2007	0.681	<5	74	61	2	40	35	94	5	<1	1	170	6.93	<5	<0.05	<0.05	<0.0001	<0.0001	0.008	0.007	0.05	<0.01	<0.001	<0.001	0.004	0.003	<0.01	<0.01
SW-2	6/14/2007	26.1	<5	56	46	1	15	20	60	3	<1	<1	106	8	2	0.11	<0.05	<0.0001	<0.0001	0.017	0.006	B0.2	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SW-2	9/19/2007	0.634	<1	83	68	<1	32	35	110	5	<1	1	207	6.9	1	<0.05	<0.05	<0.0001	<0.0001	0.004	0.002	0.06	0.02	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SW-5	4/11/2007	0.002	<5	77	63	<1	39	32	100	5	<1	1	208	7.04	<5	<0.05	<0.05	<0.0001	<0.0001	0.004	0.003	J0.05	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SW-5	6/14/2007	--	<5	59	48	<1	15	20	60	3	<1	<1	114	8	2	0.07	<0.05	<0.0001	<0.0001	0.013	0.006	0.08	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SW-5	9/19/2007	0.0695	<1	83	68	<1	36	36	110	5	<1	1	210	8.11	<1	<0.05	<0.05	<0.0001	<0.0001	0.002	0.001	<0.01	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
Drainage: New World Waste Repository																													
REPOSITORY SEEP	6/14/2007	0.001	<5	168	138	9	38	69	222	12	3	5	446	7.7	135	2.55	--	0.0001	--	0.008	--	2.93	--	0.017	--	0.33	--	<0.01	--
SBT-3	4/5/2007	0.19	<5	131	108	2	14	41	124	6	<1	1	250	8.5	<1	<0.05	<0.05	<0.0001	<0.0001	0.001	<0.001	<0.01	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SBT-3	5/16/2007	5.09	<5	52	43	<1	7	19	46	3	<1	<1	62	6.72	5	0.27	<0.05	<0.0001	<0.0001	0.004	0.001	0.29	<0.01	0.001	<0.001	<0.005	<0.003	<0.01	<0.01
SBT-3	9/19/2007	0.004	<1	167	137	1	11	51	159	9	<1	2	296	7.73	<1	<0.05	<0.05	<0.0001	<0.0001	<0.001	<0.001	0.02	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SBT-6	4/5/2007	0.272	<5	137	113	2	10	39	120	6	<1	1	240	8.1	1	<0.05	<0.05	<0.0001	<0.0001	0.002	0.001	0.02	<0.01	<0.001	<0.001	0.004	0.003	<0.01	<0.01

Notes:

cfs - Cubic feet per second
s.u. - Standard units
mg/L - Milligrams per liter
X - Field duplicate
umhos/cm - micromhos per centimeter

-- - Indicates data not collected, parameter not analyzed, or not applicable
< - Indicates analyte not detected above practical quantitation limit (PQL)
J - The associated value is an estimated quantity
JB - The analyte was detected in the method blank. Sample concentration may not represent true concentration.
JF% - The associated values are estimated quantities because field duplicate results exceed acceptable limits by relative percent difference determination
Flow Rate - Some of the flow rates shown have been converted from gallons per minute (gpm) to cubic feet per second (cfs). Please refer to original field notes for exact values.

TABLE A-1
2007 SURFACE WATER SUMMARY
NEW WORLD MINING DISTRICT RESPONSE AND RESTORATION PROJECT

Station Name	Sample Date	Flow Rate (cfs)	Anions (mg/L)					Cations (mg/L)								Metals (mg/L)													
			Acididity as CaCO3	Alkalinity as HCO3	Alkalinity as Total CaCO3	Chloride	Sulfate	Calcium	Hardness as CaCO3	Magnesium	Potassium	Sodium	Field SC (umhos/cm)	Field pH (s.u.)	Total Suspended Solids (mg/L)	Aluminum Total Recoverable	Aluminum Dissolved	Cadmium Total Recoverable	Cadmium Dissolved	Copper Total Recoverable	Copper Dissolved	Iron Total Recoverable	Iron Dissolved	Lead Total Recoverable	Lead Dissolved	Manganese Total Recoverable	Manganese Dissolved	Zinc Total Recoverable	Zinc Dissolved
SBT-6X	4/5/2007	--	<5	137	113	2	10	36	120	6	<1	1	--	--	<1	<0.05	<0.05	<0.0001	<0.0001	0.001	0.001	0.02	<0.01	<0.001	<0.001	0.004	0.003	<0.01	<0.01
SBT-6	5/16/2007	14.2	<5	60	49	<1	5	19	51	3	<1	<1	116	6.53	<3	0.2	<0.05	<0.0001	<0.0001	0.004	0.002	0.29	0.02	<0.001	<0.001	<0.005	<0.003	<0.01	<0.01
SBT-6	9/19/2007	0.0266	<1	175	144	2	7	52	160	8	<1	2	286	7.81	<1	<0.05	<0.05	<0.0001	<0.0001	0.001	<0.001	0.03	<0.01	<0.001	<0.001	0.006	0.004	<0.01	<0.01
Drainage: Soda Butte Creek																													
SBC-1	4/12/2007	1.08	<5	148	121	6	11	46	148	8	<1	1	238	6.93	<5	<0.05	--	<0.0001	--	<0.001	--	<0.01	--	<0.001	--	<0.003	--	<0.01	--
SBC-1	6/14/2007	10.6	<5	114	94	2	9	33	107	6	<1	1	171	7.05	2	<0.05	--	<0.0001	--	0.001	--	0.09	--	<0.001	--	<0.003	--	<0.01	--
SBC-1	9/19/2007	0.853	<1	147	121	2	7	43	136	7	<1	1	249	8.33	1	0.09	--	<0.0001	--	0.001	--	0.16	--	<0.001	--	0.003	--	<0.01	--
SBC-2	4/12/2007	1.4	<5	144	118	4	36	50	162	9	<1	1	267	6.93	<5	<0.05	--	<0.0001	--	0.001	--	1.57	--	<0.001	--	0.037	--	<0.01	--
SBC-2	6/14/2007	34.7	<5	77	63	2	17	28	86	4	<1	<1	155	8	<2	0.09	--	<0.0001	--	0.01	--	0.23	--	<0.001	--	<0.003	--	<0.01	--
SBC-2	9/19/2007	1.13	<1	139	114	2	31	48	153	8	<1	1	280	7.94	3	<0.05	--	<0.0001	--	<0.001	--	1.17	--	<0.001	--	0.028	--	<0.01	--
SBC-4	4/12/2007	6.3	<5	136	111	1	7	32	113	8	<1	5	244	7.14	<5	0.05	--	<0.0001	--	<0.001	--	0.13	--	<0.001	--	0.003	--	<0.01	--
SBC-4	6/14/2007	--	<5	59	48	1	<5	12	42	3	<1	4	92	7.6	9	0.56	--	<0.0001	--	0.003	--	0.67	--	<0.001	--	0.004	--	0.01	--
SBC-4	9/19/2007	9.62	<1	106	87	<1	9	27	96	7	<1	5	183	8.4	9	0.32	--	<0.0001	--	<0.001	--	0.66	--	<0.001	--	0.006	--	<0.01	--
SBMS	7/24/2007	5.54	<5	128	105	3	7	46	121	10	3	3	167	7.32	125	5.15	<0.05	0.0001	<0.0001	0.016	0.002	7.01	<0.01	0.009	<0.001	0.16	0.006	0.04	<0.01
SBMS	9/19/2007	0.993	<1	145	119	2	7	45	136	8	<1	2	244	8.15	<1	<0.05	<0.05	<0.0001	<0.0001	<0.001	<0.001	0.02	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SBMS-DS	7/24/2007	5.18	<5	133	109	2	7	42	124	9	2	3	174	7.37	57	2.93	<0.05	<0.0001	<0.0001	0.014	0.002	3.98	<0.01	0.007	<0.001	0.09	0.006	0.02	<0.01
SBMS-DS	9/19/2007	0.953	<1	150	123	2	7	45	139	8	<1	1	242	8.2	<2	<0.05	<0.05	<0.0001	<0.0001	<0.001	<0.001	0.03	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SBMS-RO(07)	7/24/2007	--0.019	<5	62	51	2	24	35	75	8	6	4	--	--	102	5.91	<0.05	0.0001	<0.0001	0.033	0.014	8.48	0.01	0.009	<0.001	0.19	0.038	0.06	<0.01
SBMS-RO(07)X	7/24/2007	--	<5	65	53	2	24	34	72	8	7	4	--	--	96	5.95	<0.05	0.0001	<0.0001	0.033	0.014	8.22	0.02	0.009	<0.001	0.19	0.038	0.06	<0.01
SBMS-US	7/24/2007	5.79	<5	131	108	3	6	42	121	8	2	3	210	7.14	53	1.09	<0.05	<0.0001	<0.0001	0.009	0.003	1.35	0.01	0.004	<0.001	0.04	0.008	0.02	<0.01
SBMS-US	9/19/2007	1.18	<1	150	123	2	7	45	139	8	<1	2	246	8.13	<1	<0.05	<0.05	<0.0001	<0.0001	<0.001	<0.001	0.04	<0.01	<0.001	<0.001	<0.003	<0.003	<0.01	<0.01
SBSW-102	4/12/2007	2.73	<5	83	68	2	7	18	65	5	<1	6	116	6.93	<5	0.14	--	<0.0001	--	0.002	--	0.33	--	<0.001	--	0.004	--	<0.01	--
SBSW-102	6/14/2007	--	<5	61	50	1	10	18	57	3	<1	3	98	8.4	5	0.29	--	<0.0001	--	0.006	--	0.45	--	<0.001	--	<0.003	--	<0.01	--
SBSW-102	9/19/2007	3.85	<1	81	66	<1	8	20	75	6	<1	6	149	8.08	13	0.51	--	<0.0001	--	0.002	--	1.24	--	<0.001	--	0.01	--	<0.01	--

Notes:

cfs - Cubic feet per second
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Flow Rate - Some of the flow rates shown have been converted from gallons per minute (gpm) to cubic feet per second (cfs). Please refer to original field notes for exact values.

Table A-2
1989 To 2007 Surface Water Database (Fisher Creek)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/l)	Cd (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Mn (mg/l)	Zinc (mg/l)	Flow (L/s)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
SW-6	06-Apr-04	Maxim	3195	0.025	0.00005	0.014	0.04	0.0005	0.0025	0.05	201.6	13.063	0.026	7.315	20.901	0.261	1.306	26.126
SW-6	28-Jun-04	Maxim	48119	0.06	0.00005	0.025	0.18	0.0005	0.008	0.03	3035.8	472.135	0.393	196.723	1416.406	3.934	62.951	236.068
SW-6	05-Oct-04	Maxim	11153	0.09	0.00005	0.007	0.02	0.0005	0.0015	0.01	703.7	164.153	0.091	12.767	36.478	0.912	2.736	18.239
SW-6	05-Apr-05	Maxim	1032	0.025	0.00005	0.0005	0.01	0.0005	0.0015	0.01	65.1	4.220	0.008	0.084	1.688	0.084	0.253	1.688
SW-6	28-Jun-05	Maxim	54012	0.1	0.00005	0.019	0.08	0.0005	0.01	0.01	3407.6	883.260	0.442	167.819	706.608	4.416	88.326	88.326
SW-6	11-Oct-05	Maxim	1064	0.025	0.00005	0.005	0.005	0.0005	0.0015	0.005	67.1	4.349	0.009	0.870	0.870	0.087	0.261	0.870
SW-6	26-Apr-06	Maxim	2504	0.025	0.00005	0.003	0.01	0.0005	0.0015	0.005	158.0	10.239	0.020	1.229	4.096	0.205	0.614	2.048
SW-6	28-Jun-06	Maxim	32599	0.07	0.00005	0.024	0.12	0.0005	0.015	0.005	2056.6	373.158	0.267	127.940	639.700	2.665	79.962	26.654
SW-6	26-Sep-06	Maxim	956	0.025	0.00005	0.004	0.005	0.0005	0.0015	0.01	60.3	3.908	0.008	0.625	0.782	0.078	0.235	1.563
SW-6	**11-Apr-07**	Tetra Tech	1813	0.025	0.00005	0.002	0.005	0.0005	0.0015	0.005	114.4	7.413	0.015	0.593	1.483	0.148	0.445	1.483
SW-6	**12-Jun-07**	Tetra Tech	45329	0.070	0.00005	0.018	0.080	0.0005	0.0015	0.005	2859.8	518.885	0.371	133.428	593.011	3.706	11.119	37.063
SW-6	**17-Sep-07**	Tetra Tech	853	0.025	0.00005	0.003	0.005	0.0005	0.0015	0.005	53.8	3.486	0.007	0.418	0.697	0.070	0.209	0.697
Average all before Oct. 2004			**29801**	**0.126**	**0.00209**	**0.021**	**0.183**	**0.0016**	**0.012**	**0.023**	**1880.1**	**674.067**	**17.542**	**114.851**	**969.230**	**10.421**	**60.865**	**112.960**
Average all after Oct. 2004			**15132**	**0.048**	**0.00005**	**0.009**	**0.034**	**0.0005**	**0.004**	**0.007**	**954.7**	**197.307**	**0.124**	**44.577**	**198.541**	**1.237**	**18.416**	**17.863**
% Change			**-49.2**	**-62**	**-98**	**-60**	**-81**	**-69**	**-70**	**-70**	**-49**	**-71**	**-99**	**-61**	**-80**	**-88**	**-70**	**-84**
Avg high flow before 10/2004			**50818**	**0.195**	**0.00405**	**0.034**	**0.302**	**0.0021**	**0.0155**	**0.027**	**3206.1**	**1243.607**	**35.051**	**222.080**	**1835.084**	**20.509**	**116.517**	**211.066**
Avg high flow after 10/2004			**26330**	**0.055**	**0.00005**	**0.016**	**0.068**	**0.0005**	**0.0060**	**0.005**	**1661.2**	**298.797**	**0.215**	**87.412**	**411.194**	**2.153**	**30.447**	**21.529**
% Change			**-48**	**-72**	**-99**	**-54**	**-77**	**-76**	**-61**	**-81**	**-48**	**-76**	**-99**	**-61**	**-78**	**-90**	**-74**	**-90**
Avg low flow before Oct 2004			**2096**	**0.047**	**0.00012**	**0.008**	**0.051**	**0.0012**	**0.0092**	**0.019**	**132.2**	**14.599**	**0.033**	**2.516**	**16.790**	**0.332**	**2.431**	**5.045**
Avg low flow after Oct 2004			**2768**	**0.034**	**0.00005**	**0.004**	**0.009**	**0.0005**	**0.0015**	**0.007**	**174.6**	**28.253**	**0.023**	**2.370**	**6.585**	**0.226**	**0.679**	**3.798**
% Change			**32**	**-28**	**-59**	**-57**	**-83**	**-57**	**-84**	**-63**	**32**	**94**	**-32**	**-6**	**-61**	**-32**	**-72**	**-25**

Note: Concentrations below the practical quantitation limit (PQL) are shown as half the PQL

Table A-2
1989 To 2007 Surface Water Database (Fisher Creek)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/l)	Cd (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Mn (mg/l)	Zinc (mg/l)	Flow (L/s)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
SW-4	11-Apr-07	Tetra Tech	376	0.025	0.00005	0.005	0.005	0.0005	0.0015	0.005	23.7	1.536	0.003	0.307	0.307	0.031	0.092	0.307
SW-4	12-Jun-07	Tetra Tech	19478	0.025	0.00005	0.040	0.130	0.0005	0.0100	0.005	1228.9	79.631	0.159	127.409	414.080	1.593	31.852	15.926
SW-4	17-Sep-07	Tetra Tech	411	0.025	0.00005	0.008	0.010	0.0005	0.0015	0.005	25.9	1.679	0.003	0.537	0.672	0.034	0.101	0.336
Average all before Oct. 2004			**10884**	**0.29**	**0.00029**	**0.092**	**0.491**	**0.0018**	**0.058**	**0.081**	**686.7**	**712.271**	**0.525**	**156.335**	**1243.724**	**4.243**	**84.591**	**89.844**
Average all after Oct. 2004			**6100**	**0.08**	**0.00013**	**0.039**	**0.082**	**0.0005**	**0.015**	**0.039**	**384.8**	**151.486**	**0.057**	**54.185**	**170.661**	**0.499**	**22.845**	**12.628**
% Change			**-44.0**	**-73**	**-57**	**-58**	**-83**	**-72**	**-75**	**-52**	**-44**	**-79**	**-89**	**-65**	**-86**	**-88**	**-73**	**-86**
Avg high flow before 10/2004			**18793**	**0.45**	**0.00023**	**0.102**	**0.823**	**0.0020**	**0.0559**	**0.102**	**1185.663**	**1274.746**	**1.007**	**264.731**	**2179.792**	**8.291**	**153.857**	**154.439**
Avg high flow after 10/2004			**19051**	**0.16**	**0.00005**	**0.056**	**0.180**	**0.001**	**0.024**	**0.010**	**1202**	**491.367**	**0.156**	**172.660**	**556.855**	**1.558**	**72.979**	**34.235**
% Change			**1**	**-65**	**-78**	**-45**	**-78**	**-75**	**-57**	**-90**	**1**	**-61**	**-85**	**-35**	**-74**	**-81**	**-53**	**-78**
Avg low flow before Oct 2004			**705**	**0.14**	**0.00036**	**0.082**	**0.102**	**0.0016**	**0.0614**	**0.058**	**44.468**	**15.827**	**0.030**	**10.549**	**15.158**	**0.122**	**7.528**	**5.635**
Avg low flow after Oct 2004			**549**	**0.05**	**0.00016**	**0.032**	**0.039**	**0.0005**	**0.011**	**0.051**	**34.6**	**5.822**	**0.015**	**3.410**	**5.150**	**0.045**	**1.360**	**3.367**
% Change			**-22**	**-66**	**-57**	**-61**	**-62**	**-69**	**-82**	**-12**	**-22**	**-63**	**-50**	**-68**	**-66**	**-63**	**-82**	**-40**
SW-6	10/02/89	Hydrometrics	1795		0.0005	0.005	0.015		0.01	0.01	113.3		0.147	1.468	4.404		2.936	2.936
SW-6	10/20/89	Hydrometrics	2029	0.05	0.0005	0.005	0.015	0.005	0.01	0.01	128.0	16.588	0.166	1.659	4.976	1.659	3.318	3.318
SW-6	05/29/90	Hydrometrics	45826	0.2	0.00005	0.035	0.23	0.001	0.02	0.02	2891.2	1498.772	0.375	262.285	1723.588	7.494	149.877	149.877
SW-6	06/06/90	Hydrometrics	55296	0.1	0.002	0.02	0.13	0.01	0.01	0.01	3488.6	904.254	18.085	180.851	1175.531	90.425	90.425	90.425
SW-6	06/07/90	Hydrometrics	62208								3924.7							
SW-6	06/13/90	Hydrometrics	52500	0.05	0.08	0.005	0.06	0.005	0.01	0.01	3312.2	429.264	686.822	42.926	515.117	42.926	85.853	85.853
SW-6	06/14/90	Hydrometrics	38599								2435.2							
SW-6	06/20/90	Hydrometrics	75390	0.2	0.001	0.03	0.26	0.005	0.02	0.15	4756.4	2465.708	12.329	369.856	3205.421	61.643	246.571	1849.281
SW-6	06/22/90	Hydrometrics	122666								7739.0							
SW-6	06/26/90	Hydrometrics	112881	0.2	0.00005	0.037	0.4	0.001	0.02	0.02	7121.7	3691.883	0.923	682.998	7383.766	18.459	369.188	369.188
SW-6	06/29/90	Hydrometrics	98061								6186.7							
SW-6	07/02/90	Hydrometrics	94524	0.2	0.0005	0.039	0.35	0.005	0.02	0.04	5963.5	3091.493	7.729	602.841	5410.113	77.287	309.149	618.299
SW-6	07/04/90	Hydrometrics	74237								4683.6							
SW-6	07/09/90	Hydrometrics	40350	0.1	0.0005	0.03	0.14	0.005	0.01	0.02	2545.7	659.842	3.299	197.952	923.778	32.992	65.984	131.968
SW-6	07/11/90	Hydrometrics	32316								2038.8							
SW-6	07/17/90	Hydrometrics	15889	0.2		0.07	0.3			0.015	1002.4	519.653		181.878	779.479			38.974
SW-6	07/19/90	Hydrometrics	11849								747.6							
SW-6	07/27/90	Hydrometrics	8483	0.05	0.00005	0.03	0.1	0.001	0.01	0.015	535.2	69.360	0.069	41.616	138.721	1.387	13.872	20.808
SW-6	08/23/90	Hydrometrics	4533								286.0							
SW-6	09/25/90	Hydrometrics	1481	0.05	0.00005	0.007	0.015	0.001	0.01	0.04	93.4	12.111	0.012	1.695	3.633	0.242	2.422	9.688
SW-6	03/15/91	Hydrometrics	449	0.05	0.0005	0.005	0.06	0.005	0.01	0.02	28.3	3.670	0.037	0.367	4.404	0.367	0.734	1.468
SW-6	06/05/91	Hydrometrics	90529	0.2	0.00005	0.0085	0.18	0.001	0.01	0.005	5711.5	2960.846	0.740	125.836	2664.761	14.804	148.042	74.021
SW-6	07/09/91	Hydrometrics	22980	0.1	0.0001	0.033	0.14	0	0.01	0.03	1449.8	375.794	0.376	124.012	526.112		37.579	112.738
SW-6	08/14/91	Hydrometrics	1750	0.05	0.00005	0.011	0.06	0.001	0.01	0.02	110.4	14.312	0.014	3.149	17.175	0.286	2.862	5.725
SW-6	09/24/91	Hydrometrics	1122	0.05	0.00005	0.0065	0.015	0.001	0.01	0.005	70.8	9.175	0.009	1.193	2.752	0.183	1.835	0.917
SW-6	07/19/92	Hydrometrics	13766	1.6	0.00005	0.11	2.88	0.001	0.05	0.13	868.5	3601.751	0.113	247.620	6483.152	2.251	112.555	292.642
SW-6	09/23/92	Hydrometrics	1589	0.05	0.0001	0.016	0.2	0.001	0.02	0.05	100.2	12.991	0.026	4.157	51.965	0.260	5.197	12.991
SW-6	07/21/93	Hydrometrics	17105	0.2	0.0001	0.062	0.24	0.001	0.03	0.01	1079.2	559.434	0.280	173.425	671.321	2.797	83.915	27.972
SW-6	09/22/93	Hydrometrics	1885	0.05	0.0001	0.019	0.03	0.001	0.03	0.009	118.9	15.413	0.031	5.857	9.248	0.308	9.248	2.774
SW-6	04/14/94	Hydrometrics	8618		0.00005	0.0005		0.001			543.7		0.070	0.705		1.409		
SW-6	06/15/94	Hydrometrics	39336	0.1	0.00005	0.016	0.11	0.001	0.01	0.005	2481.7	643.254	0.322	102.921	707.579	6.433	64.325	32.163
SW-6	05/21/96	Hydrometrics	20476	0.1	0.00005	0.021	0.15	0.0015	0.012	0.02	1291.8	334.838	0.167	70.316	502.258	5.023	40.181	66.968
SW-6	07/10/96	Hydrometrics	66966	0.05	0.0001	0.024	0.01	0.0015	0.013	0.005	4224.9	547.544	1.095	262.821	109.509	16.426	142.361	54.754
SW-6	09/11/96	Hydrometrics	1306	0.05	0.00005	0.011	0.02	0.0015	0.007	0.005	82.4	10.679	0.011	2.349	4.272	0.320	1.495	1.068
SW-6	05/06/99	Maxim	6127	0.1	0.00005	0.01	0.13	0.0005	0.008	0.005	386.5	100.187	0.050	10.019	130.243	0.501	8.015	5.009
SW-6	07/07/99	Maxim	66602	0.2	0.00005	0.034	0.27	0.0005	0.014	0.02	4201.9	2178.284	0.545	370.308	2940.684	5.446	152.480	217.828
SW-6	09/29/99	Maxim	1673	0.05	0.00005	0.016	0.06	0.0005	0.007	0.02	105.5	13.678	0.014	4.377	16.413	0.137	1.915	5.471
SW-6	04/13/00	Maxim	1145	0.025	0.00005	0.004	0.025	0.0005	0.0025	0.01	72.2	4.679	0.009	0.749	4.679	0.094	0.468	1.872
SW-6	07/08/00	Maxim	16194	0.1	0.00005	0.032	0.14	0.0005	0.018	0.01	1021.7	264.817	0.132	84.742	370.744	1.324	47.667	26.482
SW-6	10/19/00	Maxim	1499	0.05	0.00005	0.005	0.025	0.0005	0.0015	0.005	94.6	12.257	0.012	1.226	6.129	0.123	0.368	1.226
SW-6	04/21/01	Maxim	1198	0.05	0.00005	0.004	0.02	0.0005	0.0015	0.005	75.6	9.799	0.010	0.784	3.919	0.098	0.294	0.980
SW-6	06/26/01	Maxim	27118	0.05	0.00005	0.027	0.12	0.0005	0.008	0.005	1710.9	221.733	0.222	119.736	532.160	2.217	35.477	22.173
SW-6	10/11/01	Maxim	525	0.05	0.00005	0.004	0.1	0.0005	0.008	0.03	33.1	4.294	0.004	0.343	8.587	0.043	0.687	2.576
SW-6	04/23/02	Maxim	287	0.05	0.00005	0.004	0.06	0.0005	0.003	0.005	18.1	2.349	0.002	0.188	2.818	0.023	0.141	0.235
SW-6	07/01/02	Maxim	49371	0.1	0.0002	0.032	0.14	0.001	0.008	0.01	3114.9	807.370	1.615	258.358	1130.318	8.074	64.590	80.737
SW-6	10/08/02	Maxim	1508	0.05	0.0001	0.014	0.01	0.0005	0.006	0.05	95.1	12.331	0.025	3.453	2.466	0.123	1.480	12.331
SW-6	22-Apr-03	Maxim	1854	0.025	0.00005	0.005	0.12	0.0005	0.007	0.005	116.9	7.578	0.015	1.516	36.376	0.152	2.122	1.516
SW-6	01-Jul-03	Maxim	54084	0.12	0.00005	0.021	0.12	0.001	0.014	0.005	3412.2	1061.325	0.442	185.732	1061.325	8.844	123.821	44.222
SW-6	30-Sep-03	Maxim	543	0.025	0.00005	0.003	0.005	0.0005	0.02	0.03	34.3	2.220	0.004	0.266	0.444	0.044	1.776	2.664

Table A-2
1989 To 2007 Surface Water Database (Fisher Creek)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/l)	Cd (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Mn (mg/l)	Zinc (mg/l)	Flow (L/s)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
SW-4	07/25/90	Hydrometrics																
SW-4	07/26/90	Hydrometrics																
SW-4	07/27/90	Hydrometrics	3187	0.3	0.0004	0.16	0.44	0.001	0.1	1.95	201.050	156.336	0.208	83.379	229.293	0.521	52.112	1016.185
SW-4	08/14/90	Hydrometrics	1167								73.624							
SW-4	08/15/90	Hydrometrics	1391								87.782							
SW-4	08/23/90	Hydrometrics	1436								90.614							
SW-4	09/25/90	Hydrometrics	673	0.3	0.0003	0.11	0.21	0.001	0.13	0.05	42.475	33.029	0.033	12.111	23.120	0.110	14.312	5.505
SW-4	03/15/91	Hydrometrics	359	0.05	0.001	0.06	0.015	0.005	0.01	0.07	22.653	2.936	0.059	3.523	0.881	0.294	0.587	4.110
SW-4	06/05/91	Hydrometrics	24820	0.1	0.00005	0.025	0.335	0.001	0.015	0.005	1565.922	405.887	0.203	101.472	1359.721	4.059	60.883	20.294
SW-4	07/09/91	Hydrometrics	9425	0.05	0.0002	0.1	0.38	0	0.05	0.03	594.654	77.067	0.308	154.134	585.710		77.067	46.240
SW-4	08/14/91	Hydrometrics	763	0.4	0.0002	0.15	0.21	0.001	0.12	0.07	48.139	49.910	0.025	18.716	26.203	0.125	14.973	8.734
SW-4	09/24/91	Hydrometrics	494	0.3	0.0006	0.11	0.24	0.001	0.08	0.04	31.149	24.221	0.048	8.881	19.377	0.081	6.459	3.229
SW-4	05/27/92	Hydrometrics	34910	0.2	0.00005	0.051	0.31	0.001	0.03	0.02	2202.485	1141.768	0.285	291.151	1769.740	5.709	171.265	114.177
SW-4	07/19/92	Hydrometrics	6732	1.7	0.0002	0.29	3.55	0.001	0.16	0.075	424.753	1871.631	0.220	319.278	3908.405	1.101	176.153	82.572
SW-4	09/23/92	Hydrometrics	875	0.3	0.0004	0.117	0.17	0.001	0.13	0.05	55.218	42.937	0.057	16.746	24.331	0.143	18.606	7.156
SW-4	07/21/93	Hydrometrics	8941	0.3	0.0001	0.146	0.65	0.001	0.09	0.04	564.072	438.622	0.146	213.463	950.348	1.462	131.587	58.483
SW-4	09/21/93	Hydrometrics	889	0.2	0.0002	0.1	0.32	0.001	0.16	0.038	56.067	29.065	0.029	14.533	46.505	0.145	23.252	5.522
SW-4	03/02/94	Hydrometrics	180	0.05	0.0005	0.06	0.015	0.001	0.005	0.07	11.327	1.468	0.015	1.762	0.440	0.029	0.147	2.055
SW-4	05/26/94	Hydrometrics	33766	0.8	0.0001	0.11	2.25	0.003	0.06	0.018	2130.277	4417.342	0.552	607.384	12423.773	16.565	331.301	99.390
SW-4	06/15/94	Hydrometrics	15166	0.5	0.0001	0.07	0.55	0.001	0.05	0.021	956.826	1240.047	0.248	173.607	1364.052	2.480	124.005	52.082
SW-4	07/14/95	Hydrometrics	19632	0.5	0.0001	0.118	0.8	0.001	0.07	0.013	1238.579	1605.198	0.321	378.827	2568.317	3.210	224.728	41.735
SW-4	09/27/95	Hydrometrics	601	0.2	0.0003	0.173	0.09	0.001	0.12	0.04	37.945	19.670	0.030	17.015	8.852	0.098	11.802	3.934
SW-4	05/21/96	Hydrometrics		0.2	0.0001	0.063	0.18	0.0015	0.03	0.025								
SW-4	05/29/96	Hydrometrics		0.4	0.00005	0.086	0.44	0.0015	0.05	0.025								
SW-4	06/05/96	Hydrometrics		1.1	0.0001	0.139	3.17	0.005	0.067	0.015								
SW-4	06/12/96	Hydrometrics	15126			0.055	0.62			0.05	954.278			136.042	1533.563			123.674
SW-4	06/19/96	Hydrometrics	32386	0.2	0.0001	0.066	0.35	0.0015	0.031	0.005	2043.259	1059.225	0.530	349.544	1853.645	7.944	164.180	26.481
SW-4	06/26/96	Hydrometrics				0.066	1.14			0.02								
SW-4	07/02/96	Hydrometrics				0.11	2.17			0.08								
SW-4	07/11/96	Hydrometrics	24614	0.2	0.00005	0.07	0.245	0.0015	0.033	0.02	1552.896	805.021	0.201	281.757	986.151	6.038	132.829	80.502
SW-4	07/18/96	Hydrometrics	11858			0.105	0.34			0.015	748.131			203.611	659.313			29.087
SW-4	07/25/96	Hydrometrics	8941			0.129	0.4			0.03	564.072			188.608	584.829			43.862
SW-4	08/21/96	Hydrometrics	1937			0.17	0.31			0.05	122.187			53.841	98.180			15.835
SW-4	09/11/96	Hydrometrics	655	0.4	0.0003	0.154	0.17	0.0015	0.15	0.06	41.343	42.864	0.032	16.503	18.217	0.161	16.074	6.430
SW-4	03/27/98	UOS Data	310								19.539							
SW-4	04/22/98	UOS Data	259								16.367							
SW-4	05/05/98	UOS Data																
SW-4	05/13/98	UOS Data	2147								135.439							
SW-4	05/06/99	Maxim	189	0.05	0.0004	0.06	0.03	0.0005	0.021	0.05	11.893	1.541	0.012	1.850	0.925	0.015	0.647	1.541
SW-4	07/09/99	Maxim	20514	0.3	0.0001	0.08	0.29	0.0005	0.027	0.03	1294.250	1006.409	0.335	268.376	972.862	1.677	90.577	100.641
SW-4	09/30/99	Maxim	655	0.05	0.0003	0.07	0.03	0.0005	0.072	0.06	41.343	5.358	0.032	7.501	3.215	0.054	7.716	6.430
SW-4	04/13/00	Maxim	376	0.025	0.0004	0.064	0.025	0.0005	0.014	0.01	23.701	1.536	0.025	3.932	1.536	0.031	0.860	0.614
SW-4	07/08/00	Maxim	6948	0.3	0.00005	0.12	0.38	0.0005	0.064	0.03	438.345	340.857	0.057	136.343	431.752	0.568	72.716	34.086
SW-4	10/19/00	Maxim	624	0.05	0.00005	0.057	0.07	0.0005	0.058	0.04	39.360	5.101	0.005	5.815	7.142	0.051	5.917	4.081
SW-4	04/21/01	Maxim	278	0.05	0.0003	0.038	0.03	0.0005	0.008	0.08	17.556	2.275	0.014	1.729	1.365	0.023	0.364	3.641
SW-4	06/26/01	Maxim	10700	0.3	0.0002	0.089	0.43	0.001	0.048	0.02	675.074	524.937	0.350	155.731	752.410	1.750	83.990	34.996
SW-4	10/11/01	Maxim	274	0.2	0.0003	0.058	0.11	0.0005	0.009	0.09	17.273	8.954	0.013	2.597	4.925	0.022	0.403	4.030
SW-4	04/26/02	Maxim		0.05	0.0003	0.03	0.005	0.0005	0.006	0.04								
SW-4	07/01/02	Maxim	21095	0.3	0.00005	0.1	0.5	0.0005	0.051	0.02	1330.892	1034.902	0.172	344.967	1724.836	1.725	175.933	68.993
SW-4	10/08/02	Maxim	857	0.1	0.0004	0.085	0.13	0.0005	0.088	0.07	54.085	14.019	0.056	11.916	18.225	0.070	12.337	9.813
SW-4	23-Apr-03	Maxim		0.025	0.0003	0.049	0.1	0.0005	0.013	0.08								
SW-4	01-Jul-03	Maxim	18312	0.25	0.00005	0.07	0.29	0.0005	0.044	0.005	1155.327	748.652	0.150	209.623	868.437	1.497	131.763	14.973
SW-4	30-Sep-03	Maxim	405	0.025	0.0002	0.079	0.02	0.0005	0.055	0.13	25.570	1.657	0.013	5.236	1.326	0.033	3.645	8.616
SW-4	05-Apr-04	Maxim	352	0.025	0.0002	0.04	0.02	0.0005	0.005	0.1	22.200	1.439	0.012	2.302	1.151	0.029	0.288	5.754
SW-4	28-Jun-04	Maxim	31827	0.8	0.00005	0.11	1.48	0.003	0.045	0.05	2007.948	4163.681	0.260	572.506	7702.809	15.614	234.207	260.230
SW-4	05-Oct-04	Maxim	1441	0.12	0.0002	0.05	0.06	0.0005	0.029	0.02	90.897	28.273	0.047	11.780	14.136	0.118	6.833	4.712
SW-4	05-Apr-05	Maxim	314	0.025	0.0002	0.033	0.01	0.0005	0.008	0.08	19.822	1.284	0.010	1.695	0.514	0.026	0.411	4.110
SW-4	28-Jun-05	Maxim	22819	0.25	0.00005	0.063	0.2	0.0005	0.028	0.02	1439.625	932.877	0.187	235.085	746.302	1.866	104.482	74.630
SW-4	11-Oct-05	Maxim	727	0.025	0.0002	0.05	0.16	0.0005	0.005	0.03	45.873	2.973	0.024	5.945	19.025	0.059	0.595	3.567
SW-4	26-Apr-06	Maxim	278	0.025	0.0002	0.043	0.02	0.0005	0.005	0.04	17.556	1.138	0.009	1.957	0.910	0.023	0.228	1.820
SW-4	28-Jun-06	Maxim	14856	0.19	0.00005	0.064	0.21	0.0005	0.034	0.005	937.285	461.594	0.121	155.484	510.183	1.215	82.601	12.147
SW-4	26-Sep-06	Maxim	296	0.08	0.0002	0.034	0.01	0.0005	0.026	0.18	18.689	3.875	0.010	1.647	0.484	0.024	1.259	8.720

Table A-2
1989 To 2007 Surface Water Database (Fisher Creek)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/l)	Cd (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Mn (mg/l)	Zinc (mg/l)	Flow (L/s)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
SW-3	23-Apr-03	Maxim	22	2.51	0.0012	0.83	6.92	0.008	1.3	0.26	1.416	9.211	0.004	3.046	25.395	0.029	4.771	0.954
SW-3	01-Jul-03	Maxim	2949	1.62	0.0002	0.45	2.32	0.002	0.29	0.02	186.042	781.197	0.096	216.999	1118.751	0.964	139.844	9.644
SW-3	31-Jul-03	Maxim		2.83	0.0005	1.04	5.38	0.005	0.78	0.14								
SW-3	14-Aug-03	Maxim		3.1	0.0005	1.15	6.13	0.01	1.31	0.13								
SW-3	21-Aug-03	Maxim		3	0.0009	1.06	10.9	0.009	1.5	0.14								
SW-3	22-Aug-03	Maxim		3.1	0.0009	0.94	8.58	0.013	1.48	0.19								
SW-3	30-Sep-03	Maxim	116	2.86	0.0008	0.8	10.5	0.009	1.74	0.21	7.306	54.158	0.015	15.149	198.833	0.170	32.950	3.977
SW-3	05-Apr-04	Maxim	61	2.2	0.0008	0.7	2.34	0.004	0.9	0.18	3.851	21.960	0.008	6.987	23.358	0.040	8.984	1.797
SW-3	28-Jun-04	Maxim	4183	2.27	0.0002	0.37	3.84	0.005	0.18	0.05	263.913	1552.822	0.137	253.103	2626.800	3.420	123.131	34.203
SW-3	05-Oct-04	Maxim	157	1.52	0.0005	0.6	0.87	0.002	0.29	0.08	9.911	39.047	0.013	15.413	22.349	0.051	7.450	2.055
SW-3	05-Apr-05	Maxim	36	1.75	0.0009	0.8	0.9	0.002	0.49	0.18	2.265	10.276	0.005	4.697	5.285	0.012	2.877	1.057
SW-3	28-Jun-05	Maxim	3649	1.49	0.0001	0.36	1.14	0.002	0.14	0.04	230.215	889.110	0.060	214.819	680.259	1.193	83.541	23.869
SW-3	29-Aug-05	Maxim	171	1.36	0.0006	0.59	1.36	0.002	0.42	0.13	10.760	37.932	0.017	16.456	37.932	0.056	11.714	3.626
SW-3	11-Oct-05	Maxim	139	2.31	0.0007	0.73	0.9	0.002	0.52	0.12	8.778	52.560	0.016	16.610	20.478	0.046	11.832	2.730
SW-3	26-Apr-06	Maxim	31	2.61	0.0009	0.87	1.1	0.001	0.54	0.15	1.982	13.410	0.005	4.470	5.652	0.005	2.774	0.771
SW-3	28-Jun-06	Maxim	2451	1.74	0.0001	0.39	1.52	0.002	0.18	0.02	154.610	697.302	0.040	156.292	609.137	0.801	72.135	8.015
SW-3	26-Sep-06	Maxim	72	2.81	0.0008	0.79	1.89	0.002	0.59	0.14	4.531	32.999	0.009	9.277	22.195	0.023	6.929	1.644
SW-3	**09-Apr-07**	Tetra Tech	29	2.14	0.001	0.75	0.87	0.001	0.45	0.14	1.840	10.208	0.005	3.578	4.150	0.005	2.147	0.668
SW-3	**12-Jun-07**	Tetra Tech	3115	1.72	0.0002	0.32	2.46	0.002	0.13	0.01	196.505	876.067	0.102	162.989	1252.980	1.019	66.214	5.093
SW-3	**17-Sep-07**	Tetra Tech	63	2.51	0.0008	0.84	1.26	0.002	0.57	0.12	3.964	25.789	0.008	8.631	12.946	0.021	5.857	1.233
Average all before Oct. 2004			**1794**	**2.58**	**0.00079**	**0.695**	**5.352**	**0.0054**	**0.815**	**0.121**	**117.338**	**444.460**	**0.096**	**141.104**	**1080.137**	**0.947**	**64.450**	**16.934**
Average all after Oct. 2004			**901**	**2.00**	**0.00060**	**0.640**	**1.297**	**0.0018**	**0.393**	**0.103**	**56.851**	**244.064**	**0.025**	**55.748**	**243.033**	**0.294**	**24.861**	**4.615**
% Change			**-49.8**	**-23**	**-24**	**-8**	**-76**	**-66**	**-52**	**-15**	**-52**	**-45**	**-74**	**-60**	**-77**	**-69**	**-61**	**-73**
Avg high flow before 10/2004			**3130**	**1.96**	**0.00051**	**0.573**	**3.626**	**0.0036**	**0.2903**	**0.064**	**197.498**	**877.664**	**0.185**	**247.672**	**2008.268**	**1.931**	**117.930**	**27.684**
Avg high flow after 10/2004			**3071**	**1.65**	**0.00013**	**0.357**	**1.707**	**0.0020**	**0.1500**	**0.023**	**193.777**	**820.826**	**0.067**	**178.033**	**847.459**	**1.005**	**73.963**	**12.326**
% Change			**-2**	**-16**	**-74**	**-38**	**-53**	**-44**	**-48**	**-64**	**-2**	**-6**	**-64**	**-28**	**-58**	**-48**	**-37**	**-55**
Avg low flow before Oct 2004			**271**	**2.99**	**0.00098**	**0.799**	**6.680**	**0.0065**	**1.1190**	**0.170**	**17.745**	**104.086**	**0.022**	**31.207**	**216.014**	**0.134**	**28.159**	**5.848**
Avg low flow after Oct 2004			**87**	**2.13**	**0.00078**	**0.746**	**1.144**	**0.0018**	**0.4838**	**0.133**	**5.504**	**27.778**	**0.010**	**9.891**	**16.373**	**0.027**	**6.447**	**1.723**
% Change			**-68**	**-29**	**-21**	**-7**	**-83**	**-73**	**-57**	**-22**	**-69**	**-73**	**-56**	**-68**	**-92**	**-80**	**-77**	**-71**
SW-4	08/02/89	Hydrometrics		0.05	0.0005	0.03	0.015	0.005	0.11	0.01								
SW-4	09/15/89	Hydrometrics	606	0.2	0.0005	0.09	0.09	0.005	0.07	0.07	38.228	19.817	0.050	8.918	8.918	0.495	6.936	6.936
SW-4	10/20/89	Hydrometrics	534	0.1	0.0005	0.07	0.04	0.005	0.06	0.05	33.697	8.734	0.044	6.114	3.494	0.437	5.241	4.367
SW-4	03/17/90	Hydrometrics	449	0.05	0.0005	0.04	0.015	0.005	0.01	0.07	28.317							
SW-4	05/29/90	Hydrometrics	6912	0.8	0.00005	0.116	0.71	0.001	0.05	0.03	436.079	904.254	0.057	131.117	802.526	1.130	56.516	33.910
SW-4	06/05/90	Hydrometrics	12495	0.3		0.08	0.42			0.02	788.341	613.014		163.470	858.220			40.868
SW-4	06/13/90	Hydrometrics	13793	0.2		0.06	0.21			0.02	870.177	451.100		135.330	473.655			45.110
SW-4	06/15/90	Hydrometrics	9829								620.139							
SW-4	06/20/90	Hydrometrics	21302	0.3	0.0005	0.08	0.39	0.005	0.04	0.41	1343.918	1045.030	1.742	278.675	1358.540	17.417	139.337	1428.208
SW-4	06/22/90	Hydrometrics	39856								2514.536							
SW-4	06/26/90	Hydrometrics	50449	0.5	0.0002	0.087	1.02	0.001	0.05	0.02	3182.814	4124.927	1.650	717.737	8414.851	8.250	412.493	164.997
SW-4	06/28/90	Hydrometrics	45049								2842.162							
SW-4	07/03/90	Hydrometrics	37657	0.4	0.002	0.08	0.65	0.01	0.04	0.02	2375.784	2463.213	12.316	492.643	4002.720	61.580	246.321	123.161
SW-4	07/05/90	Hydrometrics	22172								1398.852							
SW-4	07/06/90	Hydrometrics																
SW-4	07/07/90	Hydrometrics																
SW-4	07/08/90	Hydrometrics																
SW-4	07/10/90	Hydrometrics	13734	0.3	0.0005	0.09	0.43	0.005	0.05	0.03	866.496	673.787	1.123	202.136	965.761	11.230	112.298	67.379
SW-4	07/11/90	Hydrometrics																
SW-4	07/12/90	Hydrometrics	11221								707.921							
SW-4	07/13/90	Hydrometrics																
SW-4	07/14/90	Hydrometrics																
SW-4	07/15/90	Hydrometrics																
SW-4	07/16/90	Hydrometrics																
SW-4	07/17/90	Hydrometrics	6463	0.4		0.14	0.49			0.03	407.763	422.768		147.969	517.891			31.708
SW-4	07/18/90	Hydrometrics																
SW-4	07/19/90	Hydrometrics	5251								331.307							
SW-4	07/20/90	Hydrometrics																
SW-4	07/21/90	Hydrometrics																
SW-4	07/22/90	Hydrometrics																
SW-4	07/23/90	Hydrometrics																
SW-4	07/24/90	Hydrometrics																

Table A-2
1989 To 2007 Surface Water Database (Fisher Creek)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/l)	Cd (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Mn (mg/l)	Zinc (mg/l)	Flow (L/s)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
SW-3	07/05/90	Hydrometrics	4372								275.806							
SW-3	07/10/90	Hydrometrics	1750	1.7	0.0005	0.59	3.18	0.005	0.27	0.08	110.436	486.624	0.143	168.887	910.273	1.431	77.287	22.900
SW-3	07/12/90	Hydrometrics	1436								90.614							
SW-3	07/17/90	Hydrometrics	1032	2		0.8	3.79			0.07	65.129	337.627		135.051	639.804			11.817
SW-3	07/19/90	Hydrometrics	1032								65.129							
SW-3	07/26/90	Hydrometrics	718	2.6	0.0004	0.99	5.66	0.003	0.56	0.22	45.307	305.333	0.047	116.261	664.686	0.352	65.764	25.836
SW-3	08/23/90	Hydrometrics	269								16.990							
SW-3	09/25/90	Hydrometrics	180	3.3	0.0009	0.96	6.98	0.007	1.29	0.16	11.327	96.884	0.026	28.185	204.925	0.206	37.873	4.697
SW-3	03/15/91	Hydrometrics	90	2.7	0.0005	0.72	2.79	0.005	0.89	0.15	5.663	39.635	0.007	10.569	40.956	0.073	13.065	2.202
SW-3	06/05/91	Hydrometrics	3142	1.1	0.0001	0.39	3.78	0.002	0.16	0.03	198.218	565.159	0.051	200.375	1942.092	1.028	82.205	15.413
SW-3	07/09/91	Hydrometrics	1346	1.46	0.0018	0.65	4.32	0.002	0.29	0.05	84.951	321.480	0.396	143.125	951.229	0.440	63.856	11.010
SW-3	08/14/91	Hydrometrics	224	2.9	0.0007	0.95	5.93	0.004	0.93	0.14	14.158	106.426	0.026	34.864	217.623	0.147	34.130	5.138
SW-3	09/24/91	Hydrometrics	90	4.3	0.0022	0.95	5.51	0.006	1.26	0.16	5.663	63.122	0.032	13.945	80.884	0.088	18.496	2.349
SW-3	07/23/93	Hydrometrics	1059	3.3	0.0004	1.1	6.62	0.001	0.56	0.13	66.828	571.618	0.069	190.539	1146.700	0.173	97.002	22.518
SW-3	09/21/93	Hydrometrics	171	3.8	0.001	1.1	11.6	0.009	1.67	0.17	10.760	105.986	0.028	30.680	323.535	0.251	46.578	4.741
SW-3	06/14/94	Hydrometrics	2433	2.6	0.0003	0.54	5	0.007	0.29	0.058	153.477	1034.314	0.119	214.819	1989.066	2.785	115.366	23.073
SW-3	07/14/95	Hydrometrics	3272	2.5	0.0004	0.766	3.32	0.008	0.41	0.076	206.430	1337.665	0.214	409.861	1776.420	4.281	219.377	40.665
SW-3	09/27/95	Hydrometrics	139	4.8	0.0009	1.53	11	0.008	1.66	0.231	8.778	109.215	0.020	34.812	250.285	0.182	37.770	5.256
SW-3	05/21/96	Hydrometrics		4.3	0.001	0.92	4.8	0.006	0.891	0.22								
SW-3	06/12/96	Hydrometrics	4057			0.417	2.73			0.08	255.984			276.684	1811.386			53.081
SW-3	06/20/96	Hydrometrics	3499	1.6	0.0002	0.395	1.72	0.0015	0.167	0.03	220.730	915.411	0.114	225.992	984.067	0.858	95.546	17.164
SW-3	06/26/96	Hydrometrics	5678			0.381	3.25			0.04	358.208			353.749	3017.545			37.139
SW-3	07/02/96	Hydrometrics	7136			0.374	6.88			0.08	450.238			436.464	8029.075			93.361
SW-3	07/11/96	Hydrometrics	4120	1.3	0.0001	0.448	1.93	0.0015	0.163	0.04	259.949	875.923	0.067	301.857	1300.409	1.011	109.827	26.951
SW-3	07/18/96	Hydrometrics	2533			0.646	2.84			0.04	159.820			267.608	1176.482			16.570
SW-3	07/25/96	Hydrometrics	3037			0.803	3.83			0.09	191.620			398.834	1902.282			44.701
SW-3	08/21/96	Hydrometrics	1145			0.98	6.46			0.15	72.265			183.564	1210.022			28.096
SW-3	09/11/96	Hydrometrics	171	3.5	0.0009	1.04	6.91	0.008	1.32	0.18	10.760	97.618	0.025	29.007	192.727	0.223	36.816	5.020
SW-3	07/08/97	UOS Data	4867	1.81	0.0025	0.411	2.6		0.165	0.0368	307.039							
SW-3	03/27/98	UOS Data	76	3.15		0.691	7.35		1.31	0.177	4.814	39.304		8.622	91.710		16.346	2.209
SW-3	04/23/98	UOS Data	50	3.08		0.745	6.92		1.26	0.177	3.171	25.319		6.124	56.886		10.358	1.455
SW-3	05/05/98	UOS Data	97	2.51		0.535	3.03		0.502	0.0965	6.145	39.977		8.521	48.259		7.995	1.537
SW-3	05/13/98	UOS Data	2147	2.26		0.443	2.82		0.348	0.0689	135.439	793.394		155.519	989.987		122.169	24.188
SW-3	05/29/98	UOS Data	975	1.77		0.361	2.71		0.231	0.0547	61.504	282.171		57.550	432.025		36.826	8.720
SW-3	05/06/99	Maxim	101	3.9	0.0011	0.9	7.49	0.007	1.35	0.29	6.354	64.234	0.018	14.823	123.363	0.115	22.235	4.776
SW-3	07/09/99	Maxim	3380	1.5	0.0002	0.41	1.85	0.002	0.162	0.06	213.226	829.022	0.111	226.599	1022.461	1.105	89.534	33.161
SW-3	09/30/99	Maxim	137	3.1	0.0005	1	7.03	0.002	1.3	0.18	8.665	69.625	0.011	22.460	157.891	0.045	29.197	4.043
SW-3	04/13/00	Maxim	25	3.2	0.0014	0.86	6.2	0.008	1.32	0.01	1.557	12.918	0.006	3.472	25.028	0.032	5.329	0.040
SW-3	05/18/00	Maxim	420			0.58				0.11	26.476			39.803				7.549
SW-3	05/18/00	Maxim	358			0.62				0.12	22.569			36.269				7.020
SW-3	05/18/00	Maxim	467	2.5	0.0004	0.6	3.19	0.003	0.56	0.12	29.450	190.833	0.031	45.800	243.503	0.229	42.747	9.160
SW-3	05/18/00	Maxim	363			0.63				0.12	22.908			37.408				7.125
SW-3	06/18/00	Maxim	3223	1.8	0.0002	0.43	2.67	0.003	0.18	0.04	203.315	948.586	0.105	226.607	1407.070	1.581	94.859	21.080
SW-3	06/18/00	Maxim	2859			0.46				0.05	180.378			215.069				23.377
SW-3	06/18/00	Maxim	2801			0.44				0.05	176.697			201.520				22.900
SW-3	06/18/00	Maxim	2478			0.44				0.06	156.309			178.267				24.309
SW-3	07/08/00	Maxim	1355			0.82				0.07	85.517			181.761				15.516
SW-3	07/08/00	Maxim	1360	2	0.00005	0.67	3.11	0.002	0.37	0.06	85.800	444.787	0.011	149.004	691.645	0.445	82.286	13.344
SW-3	07/08/00	Maxim	1418			0.77				0.07	89.481			178.590				16.235
SW-3	07/08/00	Maxim	1481			0.74				0.07	93.446			179.236				16.955
SW-3	08/16/00	Maxim	220	2.8	0.0011	0.95	5.21	0.007	1.06	0.15								
SW-3	09/01/00	Maxim	171	2.8	0.0006	0.82	7.38	0.005	1.11	0.16								
SW-3	09/17/00	Maxim	98	3.1		0.76	22	0.003	1.5	0.15								
SW-3	10/19/00	Maxim		2.9	0.00005	0.67	7.84	0.007	1.29	0.39								
SW-3	12/06/00	Maxim		3	0.001	0.72	6.44	0.007	1.25	0.18								
SW-3	04/21/01	Maxim	46	2.6	0.001	0.74	6.21	0.006	1.12	0.12	2.917	19.656	0.008	5.594	46.947	0.045	8.467	0.907
SW-3	06/11/01	Maxim		1.7	0.00005	0.48	1.92	0.0015	0.2	0.05								
SW-3	06/26/01	Maxim	1889	2.5	0.0003	0.53	6.53	0.007	0.31	0.06	119.157	772.139	0.093	163.694	2016.828	2.162	95.745	18.531
SW-3	08/31/01	Maxim	130	2.7	0.0056	0.84	10.1	0.012	1.17	0.15	8.212	57.470	0.119	17.880	214.981	0.255	24.904	3.193
SW-3	10/11/01	Maxim	121	2.4	0.0011	0.67	5.79	0.004	0.87	0.15	7.646	47.561	0.022	13.278	114.742	0.079	17.241	2.973
SW-3	04/26/02	Maxim	166	3.1	0.001	0.83	7.1	0.006	1.28	0.18	10.477	84.187	0.027	22.540	192.815	0.163	34.761	4.888
SW-3	07/01/02	Maxim	3411	1.7	0.0003	0.54	4.31	0.003	0.3	0.08	215.208	948.293	0.167	301.222	2404.201	1.673	167.346	44.626
SW-3	10/08/02	Maxim	130	3.6	0.001	0.85	10.6	0.009	1.48	0.71	8.212	76.627	0.021	18.092	225.623	0.192	31.502	15.112

Table A-2
1989 To 2007 Surface Water Database (Fisher Creek)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/l)	Cd (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Mn (mg/l)	Zinc (mg/l)	Flow (L/s)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
CFY-2	08/09/90	Hydrometrics	310	0.1	0.0005	0.05	0.12	0.005	0.04	0.01	19.539	5.064	0.025	2.532	6.077	0.253	2.026	0.506
CFY-2	06/05/91	Hydrometrics	41113	0.5	0.00005	0.03	0.83	0.002	0.03	0.005	2593.823	3361.595	0.336	201.696	5580.248	13.446	201.696	33.616
CFY-2	07/09/91	Hydrometrics	2110	0.05	0.0002	0.06	0.25		0.03	0.03	133.089	17.248	0.069	20.698	86.242		10.349	10.349
CFY-2	08/13/91	Hydrometrics	1077	0.1	0.0002	0.052	0.06	0.001	0.04	0.04	67.960	17.615	0.035	9.160	10.569	0.176	7.046	7.046
CFY-2	09/24/91	Hydrometrics	628	0.05	0.00005	0.017	0.015	0.001	0.01	0.01	39.644	5.138	0.005	1.747	1.541	0.103	1.028	1.028
CFY-2	07/23/93	Hydrometrics	7644	0.3	0.0001	0.11	0.42	0.001	0.05	0.015	482.236	374.987	0.125	137.495	524.981	1.250	62.498	18.749
CFY-2	09/21/93	Hydrometrics	1104	0.1	0.0002	0.06	0.17	0.001	0.09	0.028	69.659	18.056	0.036	10.833	30.695	0.181	16.250	5.056
CFY-2	06/15/94	Hydrometrics	17787	0.2	0.00005	0.05	0.2	0.001	0.03	0.012	1122.197	581.747	0.145	145.437	581.747	2.909	87.262	34.905
CFY-2	05/06/99	Maxim	41	0.05	0.00005	0.004	0.005	0.0005	0.0025	0.005	2.577	0.334	0.000	0.027	0.033	0.003	0.017	0.033
CFY-2	07/09/99	Maxim	9632	0.2	0.0001	0.09	0.23	0.0005	0.019	0.04	607.680	315.021	0.158	141.759	362.274	0.788	29.927	63.004
CFY-2	09/29/99	Maxim	930	0.05	0.0002	0.022	0.04	0.0005	0.017	0.04	58.644	7.600	0.030	3.344	6.080	0.076	2.584	6.080
CFY-2	04/13/00	Maxim	295	0.025	0.00005	0.008	0.025	0.0005	0.0025	0.01	18.632	1.207	0.002	0.386	1.207	0.024	0.121	0.483
CFY-2	07/08/00	Maxim	9223	0.2	0.00005	0.068	0.24	0.0005	0.035	0.02	581.911	301.663	0.075	102.565	361.995	0.754	52.791	30.166
CFY-2	09/22/00	Maxim		0.05	0.00005	0.004	0.01	0.0005	0.0015	0.005								
CFY-2	09/28/00	Maxim		0.05	0.00005	0.01	0.03	0.0005	0.004	0.005								
CFY-2	10/10/00	Maxim		0.05	0.00005	0.01	0.025	0.0015	0.0025	0.01								
CFY-2	10/19/00	Maxim		0.05	0.00005	0.008	0.025	0.0005	0.004	0.01								
CFY-2	04/21/01	Maxim	215	0.05	0.00005	0.005	0.005	0.0005	0.0015	0.01	13.592	1.762	0.002	0.176	0.176	0.018	0.053	0.352
CFY-2	06/26/01	Maxim	13761	0.05	0.0001	0.054	0.24	0.002	0.024	0.005	868.195	112.518	0.225	121.519	540.087	4.501	54.009	11.252
CFY-2	10/11/01	Maxim	220	0.05	0.00005	0.007	0.025	0.0005	0.0015	0.03	13.875	1.798	0.002	0.252	0.899	0.018	0.054	1.079
CFY-2	04/26/02	Maxim	126	0.05	0.00005	0.007	0.02	0.0005	0.005	0.03	7.929	1.028	0.001	0.144	0.411	0.010	0.103	0.617
CFY-2	07/01/02	Maxim	5835	0.3	0.00005	0.062	0.34	0.001	0.03	0.04	368.119	286.249	0.048	59.158	324.416	0.954	28.625	38.167
CFY-2	10/08/02	Maxim	12	0.05	0.0002	0.008	0.03	0.0005	0.0015	0.03	0.765	0.099	0.000	0.016	0.059	0.001	0.003	0.059
CFY-2	22-Apr-03	Maxim	1	0.025	0.00005	0.004	0.09	0.0005	0.0015	0.005	0.057	0.004	0.000	0.001	0.013	0.000	0.000	0.001
CFY-2	01-Jul-03	Maxim	1795	0.17	0.00005	0.04	0.19	0.0005	0.024	0.005	113.267	49.910	0.015	11.744	55.782	0.147	7.046	1.468
CFY-2	30-Sep-03	Maxim	6	0.025	0.00005	0.008	0.01	0.0005	0.0015	0.01	0.396	0.026	0.000	0.008	0.010	0.001	0.002	0.010
CFY-2	06-Apr-04	Maxim	20	0.025	0.00005	0.004	0.005	0.0005	0.0025	0.02	1.274	0.083	0.000	0.013	0.017	0.002	0.008	0.066
CFY-2	28-Jun-04	Maxim	1113	0.09	0.00005	0.035	0.13	0.0005	0.013	0.005	70.226	16.382	0.009	6.371	23.663	0.091	2.366	0.910
CFY-2	05-Oct-04	Maxim	1943	0.08	0.0001	0.02	0.04	0.0005	0.01	0.03	122.612	25.425	0.032	6.356	12.712	0.159	3.178	9.534
CFY-2	05-Apr-05	Maxim	242	0.025	0.00005	0.004	0.01	0.0005	0.0015	0.005	15.290	0.991	0.002	0.159	0.396	0.020	0.059	0.198
CFY-2	28-Jun-05	Maxim	26107	0.2	0.00005	0.045	0.2	0.001	0.021	0.02	1647.077	853.845	0.213	192.115	853.845	4.269	89.654	85.384
CFY-2	11-Oct-05	Maxim	346	0.025	0.00005	0.009	0.01	0.0005	0.0015	0.01	21.802	1.413	0.003	0.509	0.565	0.028	0.085	0.565
CFY-2	26-Apr-06	Maxim	413	0.025	0.00005	0.008	0.005	0.0005	0.0015	0.005	26.051	1.688	0.003	0.540	0.338	0.034	0.101	0.338
CFY-2	28-Jun-06	Maxim	15682	0.16	0.00005	0.045	0.17	0.0005	0.025	0.005	989.388	410.319	0.128	115.402	435.964	1.282	64.112	12.822
CFY-2	26-Sep-06	Maxim	390	0.025	0.00005	0.007	0.005	0.0005	0.0015	0.09	24.636	1.596	0.003	0.447	0.319	0.032	0.096	5.747
CFY-2	**11-Apr-07**	Tetra Tech	376	0.025	0.00005	0.005	0.005	0.0005	0.0015	0.005	23.697	1.536	0.003	0.31	0.31	0.031	0.09	0.31
CFY-2	**12-Jun-07**	Tetra Tech	19478	0.025	0.00005	0.040	0.130	0.0005	0.0100	0.005	1228.871	79.631	0.159	127.41	414.08	1.593	31.85	15.93
CFY-2	**17-Sep-07**	Tetra Tech	411	0.025	0.00005	0.008	0.010	0.0005	0.0015	0.005	25.911	1.679	0.003	0.54	0.67	0.034	0.10	0.34
Average all before Oct. 2004			**4792**	**0.11**	**0.00010**	**0.032**	**0.135**	**0.0009**	**0.018**	**0.017**	**302.304**	**228.214**	**0.056**	**40.712**	**354.134**	**1.118**	**23.578**	**11.042**
Average all after Oct. 2004			**5117**	**0.06**	**0.00005**	**0.01831**	**0.05615**	**0.00054**	**0.007**	**0.017**	**322.864**	**107.278**	**0.043**	**34.629**	**134.068**	**0.583**	**14.747**	**10.165**
% Change			**6.8**	**-46**	**-45**	**-42**	**-58**	**-42**	**-61**	**-5**	**7**	**-53**	**-23**	**-15**	**-62**	**-48**	**-37**	**-8**
Avg high flow before 10/2004			**11001**	**0.21**	**0.00008**	**0.060**	**0.307**	**0.0010**	**0.0285**	**0.018**	**694.074**	**541.732**	**0.121**	**94.844**	**844.144**	**2.760**	**53.657**	**24.259**
Avg high flow after 10/2004			**20422**	**0.13**	**0.00005**	**0.043**	**0.167**	**0.001**	**0.0187**	**0.010**	**1288.445**	**447.931**	**0.167**	**144.976**	**567.963**	**2.381**	**61.873**	**38.044**
% Change			**86**	**-38**	**-38**	**-28**	**-46**	**-33**	**-35**	**-44**	**86**	**-17**	**39**	**53**	**-33**	**-14**	**15**	**57**
Avg low flow before Oct 2004			**356**	**0.05**	**0.00011**	**0.016**	**0.039**	**0.0009**	**0.0127**	**0.017**	**22.467**	**4.272**	**0.010**	**2.046**	**4.128**	**0.062**	**2.092**	**1.601**
Avg low flow after Oct 2004			**589**	**0.03**	**0.00006**	**0.009**	**0.012**	**0.0005**	**0.003**	**0.021**	**37.143**	**4.904**	**0.007**	**1.265**	**2.187**	**0.048**	**0.530**	**2.432**
% Change			**65**	**-38**	**-47**	**-46**	**-69**	**-44**	**-79**	**25**	**65**	**15**	**-29**	**-38**	**-47**	**-22**	**-75**	**52**
SW-3	08/02/89	Hydrometrics		0.05	0.0005	0.03	0.015	0.005	0.11	0.01								
SW-3	09/15/89	Hydrometrics	162	3.7	0.0005	1.04	5.58	0.005	1.24	0.18	10.194	97.765	0.013	27.480	147.440	0.132	32.765	4.756
SW-3	10/20/89	Hydrometrics	117	3.7	0.0005	0.85	5.59	0.005	1.23	0.17	7.362	70.608	0.010	16.221	106.676	0.095	23.472	3.244
SW-3	03/17/90	Hydrometrics	112	2.2	0.0005	0.61	3.27	0.005	1	0.15	7.079	40.369	0.009	11.193	60.002	0.092	18.349	2.752
SW-3	05/28/90	Hydrometrics	404	3	0.0004	0.593	3.3	0.003	0.49	0.11	25.485	198.173	0.026	39.172	217.990	0.198	32.368	7.266
SW-3	06/05/90	Hydrometrics	2581	2.1		0.51	2.9			0.06	162.822	886.272		215.238	1223.900			25.322
SW-3	06/06/90	Hydrometrics	2199								138.753							
SW-3	06/13/90	Hydrometrics	2038	1.8		0.43	0.04			0.04	128.558	599.803		143.286	13.329			13.329
SW-3	06/15/90	Hydrometrics	1526								96.277							
SW-3	06/20/90	Hydrometrics	2760	1.8	0.002	0.49	2.26	0.005	0.23	0.05	174.149	812.508	0.903	221.183	1020.149	2.257	103.820	22.570
SW-3	06/22/90	Hydrometrics	5925								373.782							
SW-3	06/27/90	Hydrometrics	8030	1.7	0.0001	0.419	5.89	0.004	0.16	0.04	506.588	2232.231	0.131	550.179	7734.025	5.252	210.092	52.523
SW-3	06/28/90	Hydrometrics	7294								460.149							
SW-3	07/03/90	Hydrometrics	6688	1.6	0.0005	0.486	4.3	0.005	0.19	0.04	421.921	1749.791	0.547	531.499	4702.563	5.468	207.788	43.745

Table A-2
1989 To 2007 Surface Water Database (Daisy Creek/Stillwater River)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/L)	Cd (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Zn (mg/L)	Flow (L/sec)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
SW-7	11-Jul-03	Maxim	17773.72	0.31	0.0001	0.067	0.27	0.0005	0.01	0.005	1121.347	901.0250	0.2907	194.7377	784.7637	1.4533	29.0653	14.5327
SW-7	29-Sep-03	Maxim	637.34	0.025	0.00005	0.005	0.29	0.001	0.023	0.01	40.20993	2.6056	0.0052	0.5211	30.2250	0.1042	2.3972	1.0422
SW-7	06-Apr-04	Maxim		0.025	0.00005	0.003	0.46	0.0005	0.046	0.02								
SW-7	29-Jun-04	Maxim	39739.51	0.2	0.00005	0.037	0.34	0.0005	0.02	0.005	2507.174	1299.7190	0.3249	240.4480	2209.5222	3.2493	129.9719	32.4930
SW-7	06-Oct-04	Maxim	3514.35	0.08	0.00005	0.02	0.17	0.0005	0.038	0.005	221.7209	45.9760	0.0287	11.4940	97.6991	0.2874	21.8386	2.8735
SW-7	06-Apr-05	Maxim	547.57	0.025	0.00005	0.001	0.47	0.0005	0.037	0.01	34.54646	2.2386	0.0045	0.0895	42.0859	0.0448	3.3131	0.8954
SW-7	29-Jun-05	Maxim	36714.29	0.15	0.00005	0.026	0.2	0.0005	0.016	0.005	2316.312	900.5822	0.3002	156.1009	1200.7762	3.0019	96.0621	30.0194
SW-7	27-Sep-05	Maxim	1427.28	0.025	0.00005	0.015	0.18	0.0005	0.037	0.04	90.04734	5.8351	0.0117	3.5010	42.0125	0.1167	8.6359	9.3361
SW-7	25-Apr-06	Maxim	915.61	0.11	0.00005	0.003	0.49	0.0005	0.051	0.005	57.76622	16.4703	0.0075	0.4492	73.3677	0.0749	7.6362	0.7487
SW-7	27-Jun-06	Maxim	30798.71	0.14	0.00005	0.028	0.26	0.0005	0.02	0.005	1943.097	705.1111	0.2518	141.0222	1309.4920	2.5183	100.7302	25.1825
SW-7	27-Sep-06	Maxim	875.22	0.025	0.00005	0.003	0.13	0.0005	0.008	0.005	55.21771	3.5781	0.0072	0.4294	18.6062	0.0716	1.1450	0.7156
SW-7	**11-Apr-07**	Tetra Tech	848.20	0.025	0.00005	0.002	0.19	0.0005	0.018	0.005	53.51311	3.4676	0.0069	0.2774	26.3541	0.0694	2.4967	0.6935
SW-7	**13-Jun-07**	Tetra Tech	36353.80	0.25	0.00005	0.041	0.31	0.0005	0.012	0.005	2293.569	1486.2324	0.2972	243.7421	1842.9282	2.9725	71.3392	29.7246
SW-7	**18-Sep-07**	Tetra Tech	1126.50	0.11	0.00005	0.007	0.16	0.0005	0.024	0.005	71.07111	20.2638	0.0092	1.2895	29.4746	0.0921	4.4212	0.9211
Average all before Oct. 2003			**22237**	**0.24**	**0.00014**	**0.064**	**0.49**	**0.0020**	**0.039**	**0.022**	**1402.95**	**1327.88**	**0.45**	**312.59**	**2529.20**	**6.19**	**121.92**	**79.90**
Average all after Oct. 2003			**13896**	**0.10**	**0.00005**	**0.016**	**0.28**	**0.0005**	**0.027**	**0.010**	**876.73**	**408.13**	**0.11**	**72.62**	**626.57**	**1.14**	**40.69**	**12.15**
% Change			**-38**	**-59**	**-63**	**-76**	**-42**	**-75**	**-31**	**-57**	**-38**	**-69**	**-75**	**-77**	**-75**	**-82**	**-67**	**-85**
Avg high flow before 10/2003			**35965**	**0.38**	**0.00018**	**0.109**	**0.70**	**0.0031**	**0.039**	**0.024**	**2269.06**	**2371.08**	**0.91**	**559.58**	**4511.36**	**12.58**	**235.36**	**140.45**
Avg high flow after 10/2003			**35902**	**0.19**	**0.00005**	**0.033**	**0.28**	**0.0005**	**0.017**	**0.005**	**2265.04**	**1097.91**	**0.29**	**195.33**	**1640.68**	**2.94**	**99.53**	**29.35**
% Change			**-0.2**	**-52**	**-72**	**-70**	**-60**	**-84**	**-57**	**-79**	**-0.2**	**-54**	**-68**	**-65**	**-64**	**-77**	**-58**	**-79**
Avg low flow before Oct 2003			**1241**	**0.08**	**0.00010**	**0.015**	**0.25**	**0.0011**	**0.039**	**0.021**	**78.31**	**23.88**	**0.02**	**3.86**	**51.51**	**0.20**	**8.49**	**4.22**
Avg low flow post 10/03 (Apr&Sep)			**1322**	**0.05**	**0.00005**	**0.007**	**0.28**	**0.0005**	**0.032**	**0.012**	**83.41**	**13.98**	**0.01**	**2.50**	**47.09**	**0.11**	**7.07**	**2.31**
% Change			**7**	**-32**	**-51**	**-56**	**13**	**-55**	**-18**	**-44**	**7**	**-41**	**-46**	**-35**	**-8.6**	**-46**	**-17**	**-45**

Note: Concentrations below the practical quantitation limit (PQL) are shown as half the PQL

Table A-2
1989 To 2007 Surface Water Database (Daisy Creek/Stillwater River)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/L)	Cd (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Zn (mg/L)	Flow (L/sec)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
DC-5	25-Apr-06	Maxim	206.46	0.96	0.0005	0.23	0.64	0.0005	0.29	0.06	13.02572	32.4122	0.0169	7.7654	21.6081	0.0169	9.7912	2.0258
DC-5	27-Jun-06	Maxim	7082.54	1.13	0.00005	0.21	1.13	0.0005	0.11	0.04	446.8387	1308.7727	0.0579	243.2232	1308.7727	0.5791	127.4027	46.3282
DC-5	27-Sep-06	Maxim	125.67	2.83	0.0014	0.79	0.91	0.001	0.66	0.17	7.928697	58.1598	0.0288	16.2354	18.7016	0.0206	13.5638	3.4937
DC-5	**09-Apr-07**	Tetra Tech	193.88	1.23	0.0007	0.25	1.03	0.0005	0.32	0.09	12.23193	38.9973	0.0222	7.9263	32.6563	0.0159	10.1457	2.8535
DC-5	**13-Jun-07**	Tetra Tech	13778.16	1.39	0.0002	0.019	1.73	0.003	0.099	0.02	869.2669	3131.8642	0.4506	42.8097	3897.9317	6.7594	223.0608	45.0628
DC-5	**17-Sep-07**	Tetra Tech	187.60	4.23	0.0014	1.16	5.04	0.002	0.74	0.22	11.83572	129.7687	0.0429	35.5867	154.6181	0.0614	22.7019	6.7492
Average all before Oct. 2003			**3308**	**3.36**	**0.0013**	**1.07**	**3.18**	**0.0026**	**0.48**	**0.17**	**208.68**	**1006.24**	**0.28**	**269.83**	**1498.60**	**0.97**	**103.61**	**41.28**
Average all after Oct. 2003			**3143**	**2.05**	**0.0007**	**0.49**	**1.84**	**0.0013**	**0.37**	**0.13**	**198.27**	**577.92**	**0.11**	**78.85**	**712.85**	**0.82**	**62.70**	**27.10**
% Change			**-5**	**-39**	**-41**	**-54**	**-42**	**-49**	**-24**	**-21**	**-5**	**-43**	**-60**	**-71**	**-52**	**-16**	**-39**	**-34**
Avg high flow before 10/2003			**7686**	**1.93**	**0.0005**	**0.58**	**2.86**	**0.0016**	**0.21**	**0.08**	**484.90**	**2115.84**	**0.57**	**582.36**	**3508.83**	**2.28**	**218.03**	**88.98**
Avg high flow after 10/2003			**9532**	**0.99**	**0.0002**	**0.14**	**1.27**	**0.0014**	**0.10**	**0.05**	**601.36**	**1614.86**	**0.27**	**187.99**	**2081.58**	**2.54**	**156.44**	**72.29**
% Change			**24.0**	**-49**	**-67**	**-76**	**-56**	**-15**	**-52**	**-38**	**24.0**	**-24**	**-53**	**-68**	**-41**	**11**	**-28**	**-18.8**
Avg low flow before Oct 2003			**277**	**4.15**	**0.0018**	**1.38**	**2.69**	**0.0022**	**0.63**	**0.22**	**17.45**	**174.04**	**0.085**	**53.46**	**106.90**	**0.097**	**24.40**	**8.25**
Avg low flow post 10/03 (Apr&Sep)			**303**	**2.52**	**0.0010**	**0.65**	**2.10**	**0.0013**	**0.49**	**0.17**	**19.12**	**117.05**	**0.04**	**30.34**	**104.53**	**0.05**	**21.04**	**7.02**
% Change			**10**	**-39**	**-44**	**-53**	**-22**	**-42**	**-23**	**-24**	**10**	**-33**	**-48**	**-43**	**-2.2**	**-46**	**-13.8**	**-14.9**
SW-7	05/28/90	Hydrometrics	18087.90	0.1	0.00005	0.03	0.2	0.001	0.01	0.02	1141.169	295.7910	0.1479	88.7373	591.5820	2.9579	29.5791	59.1582
SW-7	06/05/90	Hydrometrics	36404.70	0.4		0.11	0.99			0.02	2296.78	2381.3012		654.8578	5893.7205			119.0651
SW-7	06/06/90	Hydrometrics	51660.47								3259.269							
SW-7	06/13/90	Hydrometrics	31332.91	0.26		0.07	0.61			0.02	1976.799	1332.2046		358.6705	3125.5569			102.4773
SW-7	06/15/90	Hydrometrics	25269.20								1594.239							
SW-7	06/20/90	Hydrometrics	43765.53	0.5		0.14	0.99			0.02	2761.176	3578.4842		1001.9756	7085.3987			143.1394
SW-7	06/22/90	Hydrometrics	57966.55								3657.121							
SW-7	06/27/90	Hydrometrics	62297.77	0.6	0.0002	0.147	1.02	0.001	0.05	0.03	3930.379	6112.5251	2.0375	1497.5687	10391.2927	10.1875	509.3771	305.6263
SW-7	06/28/90	Hydrometrics	62894.72								3968.04							
SW-7	07/03/90	Hydrometrics	55161.35	0.4		0.11	0.78		0.05	0.03	3480.141	3608.2101		992.2578	7036.0096		451.0263	270.6158
SW-7	07/10/90	Hydrometrics	22531.33	0.3	0.0005	0.11	0.67	0.005	0.04	0.04	1421.506	1105.3630	1.8423	405.2998	2468.6440	18.4227	147.3817	147.3817
SW-7	07/12/90	Hydrometrics	18716.26								1180.813							
SW-7	07/17/90	Hydrometrics	11086.13	0.5		0.17	0.93			0.015	699.4262	906.4564		308.1952	1686.0088			27.1937
SW-7	07/19/90	Hydrometrics	9380.57								591.8222							
SW-7	07/26/90	Hydrometrics	4667.84	0.5	0.0002	0.21	1.05	0.003	0.07	0.04	294.4952	381.6658	0.1527	160.2997	801.4983	2.2900	53.4332	30.5333
SW-7	08/22/90	Hydrometrics	2513.45								158.5744							
SW-7	09/25/90	Hydrometrics	987.43	0.05	0.00005	0.02	0.14	0.001	0.05	0.02	62.29707	8.0737	0.0081	3.2295	22.6064	0.1615	8.0737	3.2295
SW-7	03/15/91	Hydrometrics	673.25	0.05	0.0005	0.005	0.24	0.005	0.04	0.01	42.47528	5.5048	0.0550	0.5505	26.4230	0.5505	4.4038	1.1010
SW-7	06/06/91	Hydrometrics	70735.80	0.3	0.00005	0.03	0.74	0.002	0.03	0.04	4462.736	3470.2232	0.5784	347.0223	8559.8839	23.1348	347.0223	462.6964
SW-7	07/10/91	Hydrometrics	16920.94	0.4	0.0001	0.18	1.2	0.024	0.05	0.04	1067.545	1106.8309	0.2767	498.0739	3320.4928	66.4099	138.3539	110.6831
SW-7	08/13/91	Hydrometrics	1840.21	0.1	0.0002	0.034	0.15	0.001	0.07	0.06	116.0991	30.0929	0.0602	10.2316	45.1393	0.3009	21.0650	18.0557
SW-7	09/24/91	Hydrometrics	1570.91	0.05	0.0001	0.017	0.21	0.001	0.06	0.01	99.10898	12.8445	0.0257	4.3671	53.9470	0.2569	15.4134	2.5689
SW-7	07/19/92	Hydrometrics	8976.62	0.5	0.00005	0.17	0.07	0.001	0.07	0.03	566.337	733.9728	0.0734	249.5507	102.7562	1.4679	102.7562	44.0384
SW-7	09/22/92	Hydrometrics	1449.72	0.1	0.0002	0.0435	0.1	0.001	0.08	0.04	91.46343	23.7073	0.0474	10.3127	23.7073	0.2371	18.9659	9.4829
SW-7	09/23/93	Hydrometrics	1665.16	0.2	0.0001	0.06	0.29	0.001	0.07	0.016	105.0555	54.4608	0.0272	16.3382	78.9681	0.2723	19.0613	4.3569
SW-7	08/25/94	Hydrometrics	758.52	0.02	0.00005	0.007	0.16	0.001	0.027	0.004	47.85548	2.4808	0.0062	0.8683	19.8466	0.1240	3.3491	0.4962
SW-7	07/13/95	Hydrometrics	50933.36	0.6	0.0001	0.098	0.97	0.001	0.05	0.02	3213.396	4997.4737	0.8329	816.2540	8079.2492	8.3291	416.4561	166.5825
SW-7	09/27/95	Hydrometrics	1256.73	0.05	0.00005	0.021	0.17	0.001	0.03	0.0135	79.28718	10.2756	0.0103	4.3158	34.9371	0.2055	6.1654	2.7744
SW-7	06/18/96	Hydrometrics	100125.26	0.5	0.0002	0.087	1.05	0.0015	0.046	0.02	6316.923	8186.7321	3.2747	1424.4914	17192.1375	24.5602	753.1794	327.4693
SW-7	07/09/96	Hydrometrics	43819.39	0.3	0.0001	0.096	0.53	0.0015	0.038	0.02	2764.574	2149.7328	0.7166	687.9145	3797.8613	10.7487	272.2995	143.3155
SW-7	09/10/96	Hydrometrics	953.36	0.05	0.00005	0.019	0.13	0.0015	0.025	0.01	60.14782	7.7952	0.0078	2.9622	20.2674	0.2339	3.8976	1.5590
SW-7	05/06/99	Maxim	2908.43	0.4	0.00005	0.008	0.62	0.0005	0.036	0.005	183.4932	190.2457	0.0238	3.8049	294.8809	0.2378	17.1221	2.3781
SW-7	07/08/99	Maxim	50192.79	0.4	0.0001	0.064	0.53	0.0005	0.027	0.02	3166.673	3283.2069	0.8208	525.3131	4350.2492	4.1040	221.6165	164.1603
SW-7	09/29/99	Maxim	1118.94	0.05	0.00005	0.0005	0.42	0.0005	0.023	0.03	70.59391	9.1490	0.0091	0.0915	76.8514	0.0915	4.2085	5.4894
SW-7	04/12/00	Maxim	181.78	0.025	0.00005	0.004	0.43	0.0005	0.066	0.05	11.46832	0.7431	0.0015	0.1189	12.7821	0.0149	1.9619	1.4863
SW-7	07/09/00	Maxim	14474.81	0.3	0.00005	0.072	0.36	0.0005	0.029	0.02	913.2184	710.1186	0.1184	170.4285	852.1424	1.1835	68.6448	47.3412
SW-7	10/09/00	Maxim	812.38	0.005	0.00005	0.0005	0.22	0.0015	0.01	0.005	51.2535	0.6642	0.0066	0.0664	29.2268	0.1993	1.3285	0.6642
SW-7	06/29/01	Maxim	16440.69	0.2	0.0008	0.12	0.53	0.004	0.035	0.005	1037.246	537.7084	2.1508	322.6251	1424.9274	10.7542	94.0990	13.4427
SW-7	10/10/01	Maxim	686.71	0.05	0.00005	0.005	0.12	0.001	0.015	0.02	43.32478	5.6149	0.0056	0.5615	13.4757	0.1123	1.6845	2.2460
SW-7	04/25/02	Maxim		0.05	0.00005	0.003	0.26	0.0005	0.028	0.005								
SW-7	07/02/02	Maxim	33482.81	0.3	0.00005	0.089	0.49	0.0005	0.024	0.02	2112.437	1642.6310	0.2738	487.3139	2682.9640	2.7377	131.4105	109.5087
SW-7	10/09/02	Maxim	1086.17	0.1	0.0001	0.019	0.23	0.0005	0.038	0.06	68.52678	17.7621	0.0178	3.3748	40.8529	0.0888	6.7496	10.6573
SW-7	21-Apr-03	Maxim		0.025	0.0001	0.007	0.31	0.0005	0.018	0.01								

Table A-2
1989 To 2007 Surface Water Database (Daisy Creek/Stillwater River)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/L)	Cd (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Zn (mg/L)	Flow (L/sec)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
DC-2	06-Apr-04	Maxim	81.24	10.1	0.0036	2.15	5.94	0.005	1.67	0.5	5.12535	134.1776	0.0478	28.5625	78.9123	0.0664	22.1858	6.6425
DC-2	29-Jun-04	Maxim	4290.83	2.97	0.0007	0.58	4.16	0.003	0.31	0.1	270.7091	2083.9835	0.4912	406.9732	2918.9803	2.1050	217.5202	70.1678
DC-2	11-Aug-04	Maxim	161.58	9.38	0.0032	2.79	11.1	0.004	1.44	0.45	10.19407	247.8479	0.0846	73.7202	293.2955	0.1057	38.0491	11.8904
DC-2	06-Oct-04	Maxim	237.88	6.58	0.0024	1.9	7.36	0.002	1.25	0.35	15.00793	255.9656	0.0934	73.9110	286.3080	0.0778	48.6257	13.6152
DC-2	06-Apr-05	Maxim	22.44	11.6	0.0046	2.49	15.5	0.003	2.25	0.84	1.415839	42.5703	0.0169	9.1379	56.8827	0.0110	8.2572	3.0827
DC-2	29-Jun-05	Maxim	3052.04	2.37	0.0008	0.31	3.42	0.002	0.31	0.14	192.5541	1182.8673	0.3993	154.7210	1706.9225	0.9982	154.7210	69.8740
DC-2	27-Sep-05	Maxim	85.28	13.2	0.0035	2.57	12.1	0.006	1.82	0.51	5.380187	184.0799	0.0488	35.8398	168.7399	0.0837	25.3807	7.1122
DC-2	25-Apr-06	Maxim	35.91	9.15	0.003	1.54	10.2	0.002	1.95	0.5	2.265342	53.7267	0.0176	9.0425	59.8920	0.0117	11.4499	2.9359
DC-2	27-Jun-06	Maxim	2329.43	3.12	0.0005	0.69	3.38	0.002	0.34	0.1	146.9641	1188.5042	0.1905	262.8423	1287.5462	0.7619	129.5165	38.0931
DC-2	27-Sep-06	Maxim	62.84	12.4	0.0043	3.17	7.78	0.004	2.14	0.55	3.964348	127.4173	0.0442	32.5736	79.9441	0.0411	21.9898	5.6516
DC-2	**09-Apr-07**	Tetra Tech	22.44	8.3	0.0036	1.44	12	0.003	1.76	0.46	1.415744	30.4578	0.0132	5.2842	44.0353	0.0110	6.4585	1.6880
DC-2	**13-Jun-07**	Tetra Tech	4577.76	3.7	0.0004	0.41	5.36	0.009	0.23	0.07	288.8118	2769.8206	0.2994	306.9261	4012.4969	6.7374	172.1780	52.4020
DC-2	**18-Jul-07**	Tetra Tech	227.54	8.9	0.0023	2.2	10.2	0.002	1.12	0.34	14.35554	331.1652	0.0856	81.8611	379.5376	0.0744	41.6747	12.6513
DC-2	**17-Sep-07**	Tetra Tech	69.11	13.4	0.0042	3.58	12.9	0.004	2.37	0.61	4.360164	151.4407	0.0475	40.4595	145.7899	0.0452	26.7847	6.8939
Average all before Oct. 2003			**1507**	**11.74**	**0.0037**	**2.94**	**12.75**	**0.006**	**1.72**	**0.45**	**95**	**1079**	**0.33**	**390.3**	**2208.1**	**1.1**	**113.0**	**56.4**
Average all after Oct. 2003			**1090**	**8.23**	**0.0027**	**1.84**	**8.67**	**0.004**	**1.35**	**0.39**	**69**	**627**	**0.13**	**108.7**	**822.8**	**0.8**	**66.1**	**21.6**
% Change			**-28**	**-30**	**-28**	**-37**	**-32**	**-43**	**-21**	**-11.6**	**-28**	**-41.9**	**-59.7**	**-72.1**	**-62.7**	**-27.6**	**-41.6**	**-61.7**
Avg high flow before 10/2003			**2842**	**6.97**	**0.0022**	**1.93**	**9.86**	**0.006**	**0.83**	**0.27**	**179**	**2418**	**0.71**	**716.7**	**4571.6**	**2.5**	**245.1**	**102.6**
Avg high flow after 10/2003 (*Jun 2007 used*)			**3563**	**3.040**	**0.001**	**0.498**	**4.080**	**0.004**	**0.298**	**0.103**	**225**	**1806**	**0.3**	**282.9**	**2481.5**	**2.7**	**168.5**	**57.6**
% Change			**25**	**-56**	**-73**	**-74**	**-59**	**-32**	**-64**	**-62**	**25**	**-25**	**-51**	**-61**	**-46**	**7**	**-31**	**-44**
Avg low flow before Oct 2003			**244**	**11.78**	**0.0038**	**3.08**	**12.38**	**0.005**	**1.91**	**0.50**	**15**	**263**	**0.08**	**82.6**	**329.7**	**0.2**	**36.4**	**12.8**
Avg low flow post 10/03 (Apr&Sep)			**87**	**10.46**	**0.0036**	**2.40**	**10.54**	**0.004**	**1.85**	**0.53**	**5.5**	**136**	**0.05**	**34.3**	**134.9**	**0.1**	**23.2**	**6.6**
% Change			**-65**	**-11**	**-4.5**	**-22**	**-15**	**-30**	**-3.1**	**5.0**	**-65**	**-48**	**-40**	**-58**	**-59**	**-72**	**-36**	**-48**
DC-5	10/03/89	Hydrometrics	166.07		0.003	2.54	6.88		1.16	0.4	10.47723		0.0815	68.9788	186.8401		31.5021	10.8628
DC-5	07/12/90	Hydrometrics	3999.09	2.7	0.0005	0.97	4.3		0.28	0.12	252.3031	1765.7183	0.3270	634.3506	2812.0698		183.1115	78.4764
DC-5	07/28/93	Hydrometrics		3.2	0.0005	1.09	4.19	0.002	0.35	0.12								
DC-5	09/23/93	Hydrometrics	242.37	5.3	0.0023	2.17	4.68	0.002	1.2	0.36	15.2911	210.0630	0.0912	86.0069	185.4896	0.0793	47.5614	14.2684
DC-5	08/25/94	Hydrometrics	107.72	8.1	0.0027	2.85	5.7	0.002	1.23	0.42	6.796044	142.6843	0.0476	50.2037	100.4075	0.0352	21.6669	7.3984
DC-5	07/13/95	Hydrometrics	13657.93	2	0.0005	0.485	3.8	0.003	0.18	0.062	861.6818	4466.9582	1.1167	1083.2374	8487.2206	6.7004	402.0262	138.4757
DC-5	09/27/95	Hydrometrics	188.51	7.7	0.0023	2.45	2.38	0.003	1.18	0.391	11.89308	237.3668	0.0709	75.5258	73.3679	0.0925	36.3757	12.0533
DC-5	06/18/96	Hydrometrics	13797.07	1.4	0.0004	0.346	3.12	0.0015	0.143	0.06	870.46	3158.7252	0.9025	780.6564	7039.4446	3.3843	322.6412	135.3739
DC-5	07/09/96	Hydrometrics	12630.11	1.7	0.0004	0.46	2.48	0.0015	0.166	0.07	796.8362	3511.1789	0.8262	950.0837	5122.1904	3.0981	342.8563	144.5780
DC-5	09/10/96	Hydrometrics	140.04	7.2	0.0023	2.62	4.42	0.0015	1.08	0.37	8.834857	164.8796	0.0527	59.9979	101.2178	0.0343	24.7319	8.4730
DC-5	05/06/99	Maxim	529.62	1.4	0.0006	0.33	0.65	0.001	0.25	0.08	33.41388	121.2523	0.0520	28.5809	56.2957	0.0866	21.6522	6.9287
DC-5	07/08/99	Maxim	10695.65	1.2	0.0004	0.31	1.54	0.001	0.124	0.07	674.7905	2098.8685	0.6996	542.2077	2693.5479	1.7491	216.8831	122.4340
DC-5	09/29/99	Maxim	666.07	4	0.0012	1.26	2.67	0.002	0.5	0.17	42.02221	435.6862	0.1307	137.2412	290.8206	0.2178	54.4608	18.5167
DC-5	04/12/00	Maxim	192.55	2.9	0.0014	1.04	1.38	0.004	0.041	0.01	12.14793	91.3136	0.0441	32.7469	43.4527	0.1259	1.2910	0.3149
DC-5	07/09/00	Maxim	3994.60	1.6	0.0005	0.54	2.11	0.0005	0.19	0.07	252.02	1045.1772	0.3266	352.7473	1378.3274	0.3266	124.1148	45.7265
DC-5	10/09/00	Maxim	538.60	2.7	0.0046	0.61	1.3	0.0015	0.23	0.08	33.98022	237.8072	0.4052	53.7268	114.4998	0.1321	20.2576	7.0461
DC-5	06/29/01	Maxim	2292.18	1.8	0.0006	0.55	3.02	0.002	0.21	0.09	144.6142	674.7118	0.2249	206.1619	1132.0165	0.7497	78.7164	33.7356
DC-5	10/10/01	Maxim	152.60	3.5	0.001	0.71	1.19	0.003	0.41	0.15	9.627729	87.3428	0.0250	17.7181	29.6965	0.0749	10.2316	3.7433
DC-5	04/25/02	Maxim		0.05	0.0004	0.024	0.005	0.0005	0.16	0.04								
DC-5	07/02/02	Maxim	5655.27	1.6	0.0005	0.54	2.48	0.002	0.19	0.08	356.7923	1479.6891	0.4624	499.3951	2293.5181	1.8496	175.7131	73.9845
DC-5	09/18/02	Maxim		5.9	0.0021	1.61	3.66	0.003	0.93	0.21								
DC-5	09/26/02	Maxim		0.3	0.0004	0.079	0.25	0.0005	0.086	0.02								
DC-5	10/09/02	Maxim	332.14	3.7	0.001	0.76	2.07	0.003	0.45	0.15	20.95447	200.9617	0.0543	41.2786	112.4299	0.1629	24.4413	8.1471
DC-5	21-Apr-03	Maxim	255.83	2.07	0.0009	0.56	1.3	0.002	0.35	0.13	16.1406	86.6014	0.0377	23.4284	54.3874	0.0837	14.6428	5.4387
DC-5	11-Jul-03	Maxim	2450.62	2.1	0.0006	0.48	1.55	0.001	0.29	0.07	154.61	841.5732	0.2404	192.3596	621.1611	0.4007	116.2172	28.0524
DC-5	08-Sep-03	Maxim		7.84	0.0017	2.01	15.7	0.018	1.05	0.38								
DC-5	29-Sep-03	Maxim	83.03	5.34	0.0012	1.44	3	0.003	0.62	0.3	5.238617	72.5092	0.0163	19.5530	40.7355	0.0407	8.4187	4.0735
DC-5	07-Apr-04	Maxim	537.25	2.18	0.0007	0.52	1.1	0.001	0.34	0.13	33.89527	191.5273	0.0615	45.6854	96.6422	0.0879	29.8712	11.4214
DC-5	29-Jun-04	Maxim	8622.05	0.73	0.0002	0.16	1.23	0.001	0.1	0.04	543.9667	1029.2720	0.2820	225.5939	1734.2528	1.4100	140.9962	56.3985
DC-5	11-Aug-04	Maxim	368.04	3.03	0.0011	0.87	3.69	0.001	0.46	0.15	23.21982	182.3629	0.0662	52.3616	222.0855	0.0602	27.6855	9.0279
DC-5	06-Oct-04	Maxim	807.90	1.93	0.0007	0.51	2.13	0.0005	0.33	0.11	50.97033	254.9821	0.0925	67.3787	281.4051	0.0661	43.5980	14.5327
DC-5	06-Apr-05	Maxim	107.72	2.43	0.001	0.54	1.74	0.001	0.51	0.35	6.796026	42.8052	0.0176	9.5123	30.6506	0.0176	8.9838	6.1654
DC-5	29-Jun-05	Maxim	8644.47	0.7	0.0002	0.17	0.98	0.001	0.095	0.1	545.3811	989.5394	0.2827	240.3167	1385.3552	1.4136	134.2946	141.3628
DC-5	27-Sep-05	Maxim	193.00	3.88	0.0015	0.97	2.61	0.004	0.73	0.22	12.17621	122.4557	0.0473	30.6139	82.3735	0.1262	23.0393	6.9434

Table A-2
1989 To 2007 Surface Water Database (Daisy Creek/Stillwater River)

Sample Station	Sample Date	Data Source	Flow (gpm)	Al (mg/L)	Cd (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Zn (mg/L)	Flow (L/sec)	Aluminum (kg/month)	Cadmium (kg/month)	Copper (kg/month)	Iron (kg/month)	Lead (kg/month)	Manganese (kg/month)	Zinc (kg/month)
DC-2	10/03/89	Hydrometrics	89.77		0.0005	7.89	28.26		3.37	1.03	5.66337		0.0073	115.8209	414.8414		49.4698	15.1198
DC-2	07/12/90	Hydrometrics	1970.37	7.2	0.005	2.74	17.9		0.71	0.31	124.311	2319.9411	1.6111	882.8665	5767.6313		228.7720	99.8864
DC-2	06/15/94	Hydrometrics	1283.66	9	0.0021	2.64	10.4	0.003	1.08	0.332	80.98619	1889.2459	0.4408	554.1788	2183.1286	0.6297	226.7095	69.6922
DC-2	07/26/94	Hydrometrics		16.4	0.0054	5.32	15.8	0.009	2.57	0.667								
DC-2	08/22/94	Hydrometrics		28.6	0.0076	8.26	41.8	0.024	3.65	0.904								
DC-2	08/23/94	Hydrometrics		23.9	0.0074	7.27	20.4	0.006	3.43	0.886								
DC-2	09/20/94	Hydrometrics		25	0.0076	7.44	23.6	0.004	3.59	1.2								
DC-2	10/13/94	Hydrometrics																
DC-2	09/26/95	Hydrometrics	87.07	22	0.0052	6.33	16.2	0.005	2.99	0.894	5.493469	313.2596	0.0740	90.1333	230.6730	0.0712	42.5748	12.7297
DC-2	05/21/96	Hydrometrics	209.60	8.3	0.0027	1.91	5.55	0.004	1.12	0.43	13.22397	284.4952	0.0925	65.4682	190.2347	0.1371	38.3897	14.7389
DC-2	05/30/96	Hydrometrics	500.90	6.9	0.0019	1.62	5.52	0.004	0.785	0.31	31.6016	565.1884	0.1556	132.6964	452.1507	0.3276	64.3004	25.3925
DC-2	06/05/96	Hydrometrics	1252.24	7	0.0014	1.83	19.3	0.008	0.629	0.24	79.00401	1433.4488	0.2867	374.7445	3952.2231	1.6382	128.8056	49.1468
DC-2	06/12/96	Hydrometrics	4847.38			1.25	10.7			0.21	305.822			990.8632	8481.7892			166.4650
DC-2	06/18/96	Hydrometrics	6431.75	5	0.0012	1.44	9.69	0.0015	0.481	0.19	405.7805	5258.9148	1.2621	1514.5675	10191.7769	1.5777	505.9076	199.8388
DC-2	06/26/96	Hydrometrics	5071.79			1.52	8.54			0.19	319.9804			1260.6716	7082.9839			157.5840
DC-2	07/02/96	Hydrometrics	6189.38			1.38	6.76			0.24	390.4894			1396.7648	6842.1234			242.9156
DC-2	07/09/96	Hydrometrics	6947.91	4.2	0.0008	1.11	8.05	0.01	0.379	0.15	438.3448	4771.9973	0.9090	1261.1707	9146.3281	11.3619	430.6159	170.4285
DC-2	07/18/96	Hydrometrics	2215.88			2.23	8			0.33	139.8003			808.0680	2898.8988			119.5796
DC-2	07/25/96	Hydrometrics	527.38			2.7	9.84			0.39	33.2723			232.8529	848.6193			33.6343
DC-2	08/21/96	Hydrometrics	61.94			4.74	15.4			0.64	3.907725			48.0106	155.9839			6.4824
DC-2	09/10/96	Hydrometrics	80.79	20.2	0.0058	6.22	15.6	0.006	2.72	0.89	5.097033	266.8725	0.0766	82.1756	206.0996	0.0793	35.9353	11.7582
DC-2	07/09/97	UOS Data		3.27	0.0025	0.876	5.32		0.304	0.129								
DC-2	03/30/98	UOS Data	58.35	12.3		2.69	12.8		2.14	0.688	3.681191	117.3622		25.6670	122.1331		20.4191	6.5647
DC-2	04/22/98	UOS Data	32.32	12.1		2.66	11.2		1.95	0.589	2.038813	63.9437		14.0570	59.1876		10.3050	3.1126
DC-2	05/04/98	UOS Data	313.73	5.4		1.23	6.43		0.574	0.162	19.79348	277.0454		63.1048	329.8892		29.4489	8.3114
DC-2	05/29/98	UOS Data	1198.38	5.34		1.47	10		0.592	0.22	75.60599	1046.4837		288.0770	1959.7073		116.0147	43.1136
DC-2	05/06/99	Maxim	12.57	9.2	0.0038	1.94	16	0.006	1.61	0.51	0.792872	18.9071	0.0078	3.9869	32.8820	0.0123	3.3087	1.0481
DC-2	07/08/99	Maxim	4245.94	3.7	0.0012	1.07	4.83	0.002	0.37	0.15	267.8774	2569.0514	0.8332	742.9419	3353.6536	1.3887	256.9051	104.1507
DC-2	09/29/99	Maxim	208.26	12.4	0.0044	3.98	13.6	0.002	1.93	0.6	13.13902	422.2986	0.1498	135.5442	463.1662	0.0681	65.7287	20.4338
DC-2	04/12/00	Maxim	5.39	10.7	0.0056	2.51	13.5	0.004	2.02	0.01	0.339802	9.4242	0.0049	2.2107	11.8904	0.0035	1.7791	0.0088
DC-2	05/20/00	Maxim	704.66			1.42				0.19	44.45745			163.6319				21.8944
DC-2	05/20/00	Maxim	704.66			1.44				0.19	44.45745			165.9366				21.8944
DC-2	05/20/00	Maxim	722.62			1.89				0.26	45.59013			223.3406				30.7241
DC-2	05/20/00	Maxim	1171.45	5.5	0.0011	1.34	14.4	0.007	0.6	0.17	73.90698	1053.6179	0.2107	256.6996	2758.5632	1.3410	114.9401	32.5664
DC-2	06/14/00	Maxim	2315.97			1.59				0.24	146.1149			602.1806				90.8952
DC-2	06/14/00	Maxim	2724.41			1.64				0.24	171.8833			730.6552				106.9252
DC-2	06/14/00	Maxim	2890.47			1.61				0.22	182.3605			761.0123				103.9893
DC-2	06/14/00	Maxim	3438.05	4.7	0.0014	1.43	8.26	0.002	0.5	0.2	216.9071	2642.4487	0.7871	803.9791	4643.9631	1.1244	281.1116	112.4446
DC-2	07/09/00	Maxim	1570.91			1.59				0.23	99.10898			408.4558				59.0848
DC-2	07/09/00	Maxim	1077.19	6.1	0.0019	2.01	8.55	0.003	0.72	0.26	67.96044	1074.5361	0.3347	354.0685	1506.1121	0.5285	126.8305	45.7999
DC-2	07/09/00	Maxim	1270.19			2.04				0.28	80.13669			423.7372				58.1600
DC-2	07/09/00	Maxim	1503.58			1.75				0.26	94.86145			430.2915				63.9290
DC-2	10/09/00	Maxim	89.77	14	0.0045	3.77	6.54	0.007	2.23	0.54	5.66337	205.5124	0.0661	55.3415	96.0036	0.1028	32.7352	7.9269
DC-2	04/20/01	Maxim	67.32	11.1	0.0037	2.2	10.8	0.004	1.66	0.37	4.247528	122.2065	0.0407	24.2211	118.9036	0.0440	18.2759	4.0735
DC-2	06/29/01	Maxim	1443.89	5.5	0.0017	1.34	10.3	0.022	0.63	0.29	91.09531	1298.6547	0.4014	316.3995	2432.0261	5.1946	148.7550	68.4745
DC-2	10/10/01	Maxim	76.30	17.1	0.0054	4.15	14.5	0.007	2.62	0.79	4.813865	213.3659	0.0674	51.7818	180.9243	0.0873	32.6911	9.8573
DC-2	04/25/02	Maxim	139.14	10.8	0.0038	2.2	12.1	0.003	1.91	0.6	8.778224	245.7341	0.0865	50.0569	275.3132	0.0683	43.4585	13.6519
DC-2	07/02/02	Maxim	2244.16	6.2	0.0016	1.59	8.1	0.002	0.57	0.25	141.5843	2275.3155	0.5872	583.5083	2972.5897	0.7340	209.1822	91.7466
DC-2	09/18/02	Maxim		17.6	0.0047	4.13	15.5	0.006	2.31	0.64								
DC-2	09/26/02	Maxim		14.3	0.0053	4.65	10.1	0.005	2.21	0.64								
DC-2	10/09/02	Maxim	171.00	13.7	0.0038	2.92	11.8	0.01	1.91	0.54	10.78872	383.1118	0.1063	81.6559	329.9795	0.2796	53.4119	15.1008
DC-2	22-Apr-03	Maxim	85.28	7.85	0.0038	2.14	8.79	0.005	1.62	0.45	5.380202	109.4720	0.0530	29.8433	122.5808	0.0697	22.5917	6.2755
DC-2	11-Jul-03	Maxim	1059.24	6.17	0.0019	1.92	4.86	0.003	0.88	0.25	66.82777	1068.7524	0.3291	332.5777	841.8374	0.5197	152.4315	43.3044
DC-2	31-Jul-03	Maxim		13.1	0.0032	3.57	12.2	0.005	1.83	0.57								
DC-2	14-Aug-03	Maxim		15.9	0.0044	4.46	14.4	0.007	2.25	0.63								
DC-2	21-Aug-03	Maxim		15.3	0.0048	4.37	13.3	0.007	2.29	0.65								
DC-2	22-Aug-03	Maxim		19.2	0.0051	4.35	21.4	0.008	2.81	0.87								
DC-2	08-Sep-03	Maxim		18.5	0.0046	5.03	19.4	0.013	2.8	0.81								
DC-2	29-Sep-03	Maxim	29.62	12.5	0.0043	3.63	8.69	0.005	2.5	0.76	1.868912	60.5528	0.0208	17.5845	42.0963	0.0242	12.1106	3.6816

APPENDIX A-2

2007 Surface Water Field Forms

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APPENDIX B

2007 GROUNDWATER DATA
2007 SURFACE WATER AND GROUNDWATER MONITORING
New World Mining District Response and Restoration Project

APPENDIX B-1

2007 Groundwater Summary

TABLE B-1
2007 GROUNDWATER SUMMARY
NEW WORLD MINING DISTRICT RESPONSE AND RESTORATION PROJECT

Station Name	Sample Date	Depth to Water (feet)	Anions (mg/L)					Cations (mg/L)								Dissolved Metals (mg/L)						
			Acid-idity as CaCO3	Alkalinity as HCO3	Alkalinity as Total CaCO3	Chlor-ide	Sulfate	Calcium	Hard-ness as CaCO3	Magne-sium	Potass-ium	Sod-ium	Field SC (umhos/cm)	Field pH (s.u.)	Total Diss-olved Solids (mg/L)	Alum-inum	Cadmium	Copper	Iron	Lead	Manga-nese	Zinc
Drainage: Como Basin Area																						
EPA-11	7/17/2007	30.63	350	<1	<1	<1	995	151	599	54	4	3	1740	5.24	1580	0.67	0.0019	<0.001	208	0.022	8.59	0.65
EPA-11X	7/17/2007	--	394	<1	<1	<1	1010	152	598	53	4	3	--	--	1550	0.67	0.0018	<0.001	205	0.022	8.62	0.64
EPA-11R	7/17/2007	--	20	2	1	<1	<5	<1	<7	<1	<1	<1	--	--	149	<0.05	<0.0001	<0.001	0.04	<0.001	<0.003	<0.01
EPA-12	7/17/2007	1.12	111	<1	<1	<1	170	37	146	13	2	5	510	6.38	347	<0.05	<0.0001	<0.001	37.1	<0.001	2.04	0.06
FCGW-100	7/19/2007	Artesian	488	<1	<1	1	928	131	438	27	7	5	1466	5.77	1500	0.5	<0.0001	0.004	273	<0.001	9.16	0.1
MW-1	7/23/2007	10.07	111	<1	<1	2	412	80	323	30	3	4	823	4.88	801	0.32	0.0002	0.01	70.4	0.002	4.32	0.11
MW-1X	7/23/2007	--	111	<1	<1	2	437	78	314	29	3	4	--	--	793	0.32	0.0002	0.01	70.3	0.002	4.24	0.11
Drainage: Fisher Creek																						
MW-10A	7/17/2007	4	12	7	6	43	28	23	78	5	7	14	320	5.53	218	0.06	0.0002	0.044	0.22	<0.001	0.033	0.01
MW-10B	7/17/2007	Artesian	<5	148	121	8	1130	288	974	62	6	151	2374	6.69	1790	<0.05	<0.0001	0.002	2.31	<0.001	0.19	<0.01
MW-11	7/19/2007	11.3	9	6	5	<1	14	4	14	1	<1	1	43	4.8	38	<0.05	<0.0001	0.003	0.03	<0.001	<0.003	<0.01
MW-9A	7/17/2007	6.54	6	3	3	1	39	10	37	3	2	4	lab109	4.09	98	<0.05	<0.0001	0.004	0.21	<0.001	0.004	<0.01
MW-9B	7/17/2007	Artesian	6	5	4	1	48	13	49	4	2	5	96	4.75	117	<0.05	<0.0001	<0.001	0.95	<0.001	0.087	0.01
SB-16	8/20/2007	10.65	<1	97	80	2	218	84	267	14	3	21	458	7.77	356	<0.05	<0.0001	<0.001	0.39	<0.001	0.18	<0.01
TRACER 5	7/24/2007	5.58	316	<1	<1	<1	346	8	32	3	3	5	633	4.6	725	31.7	0.0026	0.62	76.6	0.006	1.36	0.35
Drainage: McLaren Pit Area																						
DCGW-100	7/24/2007	100.89	<5	182	149	1	148	90	299	18	1	3	556	7.03	453	<0.05	0.0002	0.012	0.32	<0.001	0.55	0.02
DCGW-101D	7/18/2007	6.81	<5	83	68	<1	116	54	176	10	2	4	361	6.94	550	<0.05	<0.0001	<0.001	<0.01	<0.001	0.37	<0.01
DCGW-101S	7/18/2007	6.85	20	<1	<1	1	90	22	76	5	1	2	161	4.18	177	1.68	0.0004	0.12	<0.01	0.002	0.17	0.07
DCGW-104	7/19/2007	18.73	1230	<1	<1	2	1920	125	625	76	<1	5	3382	2.6	3620	98.6	0.024	39.1	140	<0.001	13.7	3.96
DCGW-105	7/19/2007	23.8	450	<1	<1	1	HT490	11	56	7	2	4	1404	2.71	1120	28.9	0.003	8.27	106	0.012	1.02	0.41
DCGW-107	7/18/2007	16.92	<5	127	104	<1	216	82	258	13	5	36	574	7.88	602	<0.05	0.0001	0.001	0.67	<0.001	0.94	<0.01
DCGW-108	7/18/2007	10	50	<1	<1	<1	75	20	66	4	2	3	58	4.82	495	0.44	0.001	0.4	0.43	<0.001	0.53	0.21
DCGW-111D	7/19/2007	11.37	163	4	3	<1	748	197	628	33	4	6	1320	5.4	1300	9.59	0.019	12.4	39.9	0.012	6.1	2.24
DCGW-111S	7/19/2007	5.02	85	<1	<1	4	706	222	670	28	4	7	1259	5.22	1260	5.08	0.022	6.85	2.17	0.011	4.76	2.66
DCGW-132	7/18/2007	5.81	455	<1	<1	2	HT755	82	328	30	4	5	1271	3.99	1470	35.4	0.014	12.3	146	0.008	4.75	1.76
DCGW-133	7/18/2007	4.18	225	<1	<1	2	HT392	55	195	14	3	3	1026	3.04	711	18	0.0074	7.31	21	0.008	2.32	0.85

Notes:
- cfs - Cubic feet per second
- s.u. - Standard units
- mg/L - Milligrams per liter
- R - Rinsate blank
- X - Field duplicate
- umhos/cm - Micromhos per centimeter

-- - Indicates data not collected or parameter not analyzed
< - Indicates analyte not detected above practical quantitation limit (PQL)
- All parameters are dissolved except for the repository sump samples which were analyzed as total recoverable.

HT - The analysis was performed after the holding time had passed.

JH - The associated value is estimated due to holding time exceedance.

UJ - The analyte was not detected above the reported quantitation limit but this limit is approximate and may be inaccurate or imprecise.

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Tetra Tech

Revision Date

2/21/2008

TABLE B-1
2007 GROUNDWATER SUMMARY
NEW WORLD MINING DISTRICT RESPONSE AND RESTORATION PROJECT

Station Name	Sample Date	Depth to Water (feet)	Anions (mg/L)					Cations (mg/L)								Dissolved Metals (mg/L)						
			Acid-idity as CaCO3	Alkalinity as HCO3	Alkalinity as Total CaCO3	Chlor-ide	Sulfate	Calcium	Hard-ness as CaCO3	Magne-sium	Potass-ium	Sod-ium	Field SC (umhos/cm)	Field pH (s.u.)	Total Diss-olved Solids (mg/L)	Alum-inum	Cadmium	Copper	Iron	Lead	Manga-nese	Zinc
DCGW-136	7/18/2007	4.74	39	<1	<1	<1	174	45	149	9	1	2	346	5	320	3.39	0.0029	1.94	<0.01	0.001	0.81	0.37
DCGW-137	7/18/2007	4.35	<5	93	76	<1	36	33	99	4	1	6	87	6.8	353	<0.05	<0.0001	<0.001	<0.01	<0.001	0.028	<0.01
DCGW-138	7/18/2007	7.78	<5	28	23	<1	64	28	82	3	<1	1	129	5.47	160	<0.05	0.0002	0.007	<0.01	<0.001	<0.003	0.05
MW-2	7/23/2007	9.44	377	<1	<1	2	484	18	74	7	3	4	754	4.67	858	36.4	0.0015	0.32	98.6	0.01	0.94	0.21
MW-3	7/23/2007	4.75	<5	216	177	1	24	46	185	17	2	5	358	7.73	269	<0.05	<0.0001	<0.001	<0.01	<0.001	0.32	<0.01
TRACER 2	7/19/2007	26.68	515	<1	<1	<1	607	7	46	7	4	4	861	4.2	1160	68.8	0.0012	3.6	J88.2	<0.001	0.45	0.17
Drainage: New World Waste Repository																						
REPOSITORY SUMP	5/16/2007	3.42	<5	1340	1100	8	1600	683	2660	233	6	82	3668	6.63	3340	<0.05	<0.0001	0.003	1.31	<0.001	4.89	<0.01
REPOSITORY SUMP X	5/16/2007	--	<5	1350	1100	8	1550	685	2660	231	6	80	--	--	3300	<0.05	<0.0001	0.002	1.23	<0.001	4.96	<0.01
REPOSITORY SUMP	9/19/2007	4.4	<1	1340	1100	9	1470	628	2420	207	6	80	3427	6.49	3420	<0.05	<0.0001	<0.001	0.72	<0.001	4.18	<0.01
SBGW-105	5/16/2007	4	<5	142	121	1	18	12	34	1	2	47	179	8.22	200	<0.05	<0.0001	<0.001	<0.01	<0.001	0.012	0.02
SBGW-105	6/26/2007	24	<5	136	116	2	15	15	46	2	2	39	149	8.02	211	<0.05	<0.0001	<0.001	<0.01	<0.001	<0.005	<0.01
SBGW-105T	5/16/2007	13.95	<5	195	159	<1	20	51	177	12	1	2	329	7.55	208	<0.05	<0.0001	<0.001	0.16	<0.001	0.19	<0.01
SBGW-105T	6/26/2007	7.6	<5	191	157	6	20	54	188	13	1	3	342	7.69	206	<0.05	<0.0001	<0.001	0.1	<0.001	0.12	<0.01
SBGW-107	5/16/2007	6.55	<5	219	190	2	110	22	80	6	1	100	573	8.76	520	<0.05	<0.0001	0.001	<0.01	<0.001	0.11	0.01
SBGW-107	6/26/2007	11.9	<5	216	187	3	80	28	103	8	1	88	529	8.53	354	<0.05	<0.0001	0.003	<0.01	<0.001	0.014	<0.01
SBGW-107T	5/16/2007	4.45	<5	170	139	6	52	69	205	8	<1	3	441	7.66	258	<0.05	<0.0001	<0.001	<0.01	<0.001	<0.003	0.01
SBGW-107T	6/26/2007	9.75	<5	238	195	7	47	91	268	10	<1	3	503	7.02	312	<0.05	<0.0001	<0.001	<0.01	<0.001	<0.005	<0.01
SBGW-107TX	6/26/2007	--	<5	241	197	6	47	89	263	10	<1	3	--	--	306	<0.05	<0.0001	<0.001	<0.01	<0.001	<0.005	<0.01
SBGW-108	5/16/2007	4.8	<5	124	101	4	11	36	110	5	<1	2	187	6.7	142	<0.05	<0.0001	0.002	<0.01	<0.001	<0.003	<0.01
SBGW-108	6/26/2007	9.1	<5	133	109	5	9	42	130	6	<1	2	119	6.44	132	<0.05	<0.0001	0.001	<0.01	<0.001	<0.005	<0.01
SBGW-108T	5/16/2007	4.48	<5	167	137	7	26	66	194	7	<1	2	407	7.57	243	<0.05	<0.0001	<0.001	<0.01	<0.001	<0.003	<0.01
SBGW-108T	6/26/2007	8.2	<5	210	172	8	23	81	239	9	<1	2	460	7.68	303	<0.05	<0.0001	<0.001	<0.01	<0.001	<0.005	<0.01

Notes:
- cfs - Cubic feet per second
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- mg/L - Milligrams per liter
- R - Rinsate blank
- X - Field duplicate
- umhos/cm - Micromhos per centimeter

-- - Indicates data not collected or parameter not analyzed
< - Indicates analyte not detected above practical quantitation limit (PQL)
- All parameters are dissolved except for the repository sump samples which were analyzed as total recoverable.

HT - The analysis was performed after the holding time had passed.

JH - The associated value is estimated due to holding time exceedance.

UJ - The analyte was not detected above the reported quantitation limit but this limit is approximate and may be inaccurate or imprecise.

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Revision Date

2/21/2008

TABLE B-2
McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
MW- 2	7/9/2002	60.0	ND			Artesian		5.0	3.44	797	89	NM	4
	7/17/2003					Artesian		5.3	3.81	785	250	0.64	4
	8/1/2003	69.0	5.1	2,946.95 1	10.34	3.15	2943.80	4.1	3.76	751	287	0.67	5
	8/13/2003				10.73	3.27	2943.68	2.9	3.79	632	266	0.74	5
	8/27/2003				11.21	3.42	2943.53	2.7	3.70	1,163	283	0.87	5
	9/8/2003				11.85	3.61	2943.34	2.9	3.57	732	272	0.45	5
	9/30/2003	69.0	2.6	2,946.95 1	14.72	4.49	2942.46	2.8	3.86	752	255	1.85	5
				2003 Minimum			2942.46	2.7	3.57	632	255	0.45	
				2003 Maximum			2943.80	5.3	3.86	1163	287	1.85	
				2003 Mean			2943.36	3.5		803	273	0.92	
	7/21/2004	69.0	2.6	2,946.95 1	9.35	2.85	2944.10	3.2	3.53	760	289	4.26	6
	8/11/2004	67.4	1.0	2,946.46 2	8.94	2.72	2943.74	3.4	3.60	789	263	0.00	6
	9/28/2004				10.88	3.32	2943.14	2.9	3.60	778	215	0.21	6
				2004 Mean	9.72	2.96	2943.66	3.1		776	256	1.49	
	4/7/2005				33.35	10.17	2936.29						
	5/23/2005				34.32	10.46	2936.00						
	7/11/2005				7.95	2.42	2944.04	3.9	3.84	731	255	0.58	6
	9/26/2005				12.29	3.75	2942.71	3.7	3.50	767	283	0.68	6
				2005 Mean	21.98	6.70	2939.76	3.8		749	269	0.63	
	7/18/2006				8.83	2.69	2943.77	4.2	3.88	761	284	0.20	6
	10/2/2006				13.91	4.24	2942.22	2.9	4.05	759	284	0.11	6
				2006 Mean	11.37	3.47	2942.99	3.5		760	284	0.16	
	7/23/2007				9.44	2.88	2943.58	2.9	4.67	754	-6	0.23	6
	9/19/2007				12.82	3.91	2942.55	2.8	4.20	756	59	0.23	6
				2007 Mean	11.13	3.39	2943.07	2.8		755	26	0.23	
DCGW 100	8/1/2003	237.0	2	3,020 3	90.91	27.71	2992.29	2.6	6.95	976	42.5	3.80	4
	8/11/2003				96.15	29.31	2990.69	6.1	6.82	661	81.5	2.94	4
	8/19/2003				99.61	30.36	2989.64	6	6.75	589	NM	NM	4
	8/27/2003				113.62	34.63	2985.37	2.9	6.8	565	85	1.80	4
	9/9/2003				116.47	35.50	2984.50	1.6	7.13	533	109.3	1.51	4
	9/30/2003				120.23	36.65	2983.35	3.2	6.68	547	172.4	2.46	4
				2003 Minimum	90.91	27.7	2983.35	1.6	6.7	533	43	1.51	
				2003 Maximum	120.23	36.6	2992.29	6.1	7.1	976	172	3.80	
				2003 Mean	106.17	32.4	2987.64	3.7		645	98	2.50	
	8/10/2004				100.03	30.49	2989.51	3.7	7.59	589	-0.2	0.46	4
	7/25/2005				94.33	28.75	2991.25	1.0	6.20	1410	NM	NM	9
	9/28/2005				107.91	32.89	2987.11	3.5	6.64	543	53	3.15	9
				2005 Mean	101.12	30.82	2989.18	2.3		977	53	3.15	
	7/26/2006				98.47	30.01	2989.99	8.2	6.99	606	41	0.77	9
	10/3/2006				111.29	33.92	2986.08	1.8	7.39	542	61	1.79	3
				2006 Mean	104.88	31.97	2988.03	5.0		574	51	1.28	
	7/24/2007				100.89	30.75	2989.25	4.4	7.03	556	-82	0.54	9
	9/25/2007				108.14	32.96	2987.04	1.4	6.87	526	30	1.60	3
				2007 Mean	104.52	31.86	2988.14	2.9		541	-26	1.07	
Tracer 2	7/8/2002	129.0	NM	2,986 3	18.51	5.64	2980.36	5.0	3.66	732	766	NM	
	7/17/2003				22.64	6.90	2979.10	5.2	3.61	759	297	0.44	4
	8/1/2003				30.56	9.31	2976.69	3.0	3.65	543	385	0.90	5
	8/11/2003				38.53	11.74	2974.26	2.8	3.45	476	386	0.90	5
	8/27/2003				51.44	15.68	2970.32	2.1	3.31	570	406	0.74	5
	9/8/2003				59.79	18.22	2967.78	2.3	3.08	567	453	0.82	5
	9/30/2003				71.97	21.94	2964.06	3.1	3.25	613	457	3.20	4
				2003 Minimum	22.64	6.9	2964.06	2.1	3.1	476	385	0.74	
				2003 Maximum	71.97	21.9	2979.10	5.2	3.7	759	453	0.90	
				2003 Mean	45.82	14.0	2972.03	3.1		588	407	0.84	
	7/21/2004				20.92	6.38	2979.62	2.0	3.53	786	308	0.15	6
	7/12/2005				18.90	5.76	2980.24	3.0	3.73	760	287	1.68	6
	7/12/2006				18.63	5.68	2980.32	2.1	3.96	874	288	0.02	6
	10/2/2006				73.83	22.50	2963.50	2.1	3.48	755	384	0.97	3
				2006 Mean	46.23	14.09	2971.91	2.1	3.72	815	336	0.50	
	7/19/2007				26.68	8.13	2977.87	2.1	4.20	861	65	0.44	6
	9/25/2007				70.16	21.38	2964.62	2.1	3.30	778	140	1.99	3
				2007 Mean	48.42	14.76	2971.24	2.1	3.75	820	103	1.22	

TABLE B-2
McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 101 S	10/10/2001	14.7	2.6	2856.09	7.70	2.35	2853.74	4.9	5.29	249	260	NM	4
	7/10/2002				5.60	1.71	2854.38	4.5	4.51	235	142	NM	4
	9/5/2002				6.93	2.11	2853.98	6.5	4.48	223	NM	NM	4
	9/17/2002				6.41	1.95	2854.14	5.0	4.56	187	NM	NM	4
	10/7/2002				6.39	1.95	2854.14	6.0	4.58	235	NM	NM	4
				2002 Minimum	5.60	1.71	2853.98	4.5	4.48	187			
				2002 Maximum	6.93	2.11	2854.38	6.5	4.58	235			
				2002 Mean	6.33	1.93	2854.16	5.5		220			
	7/16/2003				6.08	1.85	2854.24	4.5	4.53	255	205	8.97	2
	7/31/2003				6.61	2.01	2854.08	3.4	4.07	238	380	9.57	4
	8/11/2003				7.07	2.15	2853.94	3.4	4.12	203	495	6.93	6 *
	8/27/2003				7.65	2.33	2853.76	3.8	4.40	244	394	6.16	6
	9/9/2003				8.02	2.44	2853.65	4.2	4.48	244	321	3.23	6 **
	10/1/2003				8.32	2.54	2853.55	4.6	4.55	253	399	4.47	6 *
				2003 Minimum	6.08	1.85	2853.55	3.4	4.07	203	321	3.23	
				2003 Maximum	8.32	2.54	2854.24	4.6	4.55	255	495	6.93	
				2003 Mean	7.29	2.22	2853.87	4.0		240	402	5.20	
	7/20/2004				6.12	1.87	2854.22	2.2	4.38	253	327	6.64	6
	8/11/2004				6.94	2.12	2853.97	3.0	4.47	246	282	5.88	6
	9/28/2004				4.16	1.27	2854.82	4.1	4.30	248	383	3.53	6
				2004 Mean	6.95	1.75	2854.34	3.1		249	331	5.35	
	7/11/2005				4.14	1.26	2854.83	2.4	4.07	232	357	8.97	6
	9/27/2005				6.95	2.12	2853.97	5.0	3.69	218	464	6.90	6
				2005 Mean	5.66	1.69	2854.40	3.7		225	410	7.94	
	7/11/2006				5.76	1.76	2854.33	2.1	4.14	208	316	7.25	6
	10/3/2006				7.57	2.31	2853.78	4.7	4.37	220	428	5.52	6
				2006 Mean	5.63	2.03	2854.06	3.4		214	372	6.39	
	7/18/2007				6.85	2.09	2854.00	3.5	4.18	161	99	9.35	6
	9/25/2007				6.96	2.12	2853.97	5.2	4.02	163	75	6.43	6
				2007 Mean	6.45	2.10	2853.99	4.4		162	87	7.89	
DCGW- 101 D	10/10/2001	27.4	2.4	2857.30	7.38	2.25	2855.05	3.2	6.70	536	258	NM	4
	7/10/2002				5.70	1.74	2855.56	4.5	6.12	442	6	NM	4
	9/5/2002				7.36	2.24	2855.06	5.1	5.32	382	NM	NM	4
	9/17/2002				6.19	1.89	2855.41	4.0	7.41	303	NM	NM	4
	10/7/2002				6.18	1.88	2855.42	5.0	7.32	406	NM	NM	4
				2002 Minimum	5.70	1.74	2855.06	4.0	5.32	303			
				2002 Maximum	7.36	2.24	2855.56	5.1	7.41	442			
				2002 Mean	6.36	1.94	2855.36	4.7		383			
	7/16/2003				4.95	1.51	2855.79	4.5	7.06	418	114	4.13	2
	7/31/2003				6.61	2.01	2855.29	2.4	7.20	394	76	1.02	6
	8/11/2003				7.01	2.14	2855.16	2.4	6.75	332	300	0.78	6 **
	8/27/2003				7.61	2.32	2854.98	2.5	6.62	399	213	0.64	6
	9/9/2003				7.98	2.43	2854.87	2.7	6.63	385	202	0.48	6
	10/1/2003				8.18	2.49	2854.81	2.9	6.50	437	297	0.17	6 *
				2003 Minimum	4.95	1.51	2854.81	2.4	6.50	332	76	0.17	
				2003 Maximum	8.18	2.49	2855.79	4.5	7.20	437	300	1.02	
				2003 Mean	7.06	2.15	2855.15	2.9		394	218	0.62	
	7/20/2004				6.07	1.85	2855.45	2.6	6.70	441	-84	0.04	6
	8/11/2004				6.92	2.11	2855.19	2.5	6.94	448	-78	0.05	6
	9/28/2004				4.22	1.29	2856.01	2.8	6.65	410	146	0.20	6
				2004 Mean	5.74	1.75	2855.55	2.6		433	-5	0.10	
	7/11/2005				4.22	1.29	2856.01	2.2	6.35	354	223	0.32	6
	9/27/2005				6.92	2.11	2855.19	2.9	5.67	402	374	0.09	6
				2005 Mean	5.27	1.70	2855.60	2.6		378	299	0.21	
	7/11/2006				5.75	1.75	2855.55	2.4	5.58	376	243	1.20	6
	10/3/2006				7.33	2.23	2855.07	3.2	7.36	399	160	0.09	6
				2006 Mean	5.54	1.99	2855.31	2.8		388	201	0.65	
	7/18/2007				6.81	2.08	2855.22	2.5	6.94	361	9	0.50	6
	9/25/2007				6.92	2.11	2855.19	3.2	6.36	389	45	0.35	6
				2007 Mean	6.36	2.09	2855.21	2.8		375	27	0.43	

TABLE B-2
McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 103 S	7/8/2002	30.0	2.9	2923.90 3	--			15.0	6.15	700			
	9/17/2002				Artesian			8.0	7.03	563			
	10/7/2002				6.94	2.12	2921.78	4.0	6.91	718			
				2002 Mean				9.0	6.70	660			
	7/9/2003				0.01	0.00	2923.90	8.00	6.52	710		1.12	6
	7/31/2003				18.51	5.64	2918.26	3.70	6.81	686	77	2.10	6
	8/12/2003				27.65	8.43	2915.47	2.90	6.82	595	-21	2.28	6
	8/27/2003				27.67	8.43	2915.47	2.90	6.84	729	83	3.46	6
	9/10/2003				28.41	8.66	2915.24	2.90	6.89	720	108	3.04	6
	10/1/2003				25.40	7.74	2916.16	3.00	6.53	770	256	2.16	6
				2003 Minimum	0.01	0.00	2915.24	2.9	6.52	595	-21	2.10	
				2003 Maximum	28.41	8.66	2923.90	8.0	6.89	770	256	3.46	
				2003 Mean	21.28	6.48	2917.42	3.9		702	101	2.61	
	7/11/2006				0.01	0.00	2923.90	3.4	6.87	34	-4	8.2	6
	7/18/2007				0.10	0.03	2923.87	3.0	7.05	676	-42	1.3	6
DCGW- 103 D	7/8/2002		2.9	2923.90 3	Artesian			9.0	6.41	534			
	9/17/2002				Artesian			6.0	7.38	408			
	10/7/2002				Artesian			7.0	7.38	499			
				2002 Mean				7.3	7.06	480			
	7/9/2003				Artesian			7.6	6.76	550		0.81	6
	7/31/2003				Artesian			3.1	7.10	534	-13	0.74	6
	8/12/2003				Artesian			3.2	7.21	507	-130	0.76	6
	8/27/2003				Artesian			3.0	6.97	891	-77	0.74	6
	9/10/2003				Artesian			3.0	7.15	498	73	0.42	6
	10/1/2003				Artesian			3.0	7.06	611	-6	0.24	6
				2003 Minimum				3.0	6.76	498	-130	0.24	
				2003 Maximum				7.6	7.21	891	73	0.81	
				2003 Mean				3.8		599	-31	0.62	
	7/11/2006				Artesian	0.054 gpm		3.1	7.21	523	-1	0.11	6
	7/18/2007				Artesian	0.064 gpm		3.0	7.66	495	-44	0.82	6
DCGW- 104	10/8/2001	26.7	3.4	2924.76 1	NM	NM	NM	NM	NM	NM	NM	NM	
	7/9/2002	26.7	3.4		20.28	6.18	2918.58	4.5	2.89	2890	33	NM	4
	9/17/2002	26.7	8.0		23.46	7.15	2917.61	4.0	3.19	2060	NM	NM	4
	10/7/2002	26.7	8.0		24.67	7.52	2917.24	5.0	3.18	2480	NM	NM	4
				2002 Minimum	20.28	6.18	2917.24	4.0	2.89	2060			
				2002 Maximum	24.67	7.52	2918.58	5.0	3.19	2890			
				2002 Mean	22.80	6.95	2917.81	4.5		2477			
	7/17/2003	19.5	2.0	2922.56 1	13.42	4.09	2918.47	5.6	2.47	2960	515	4.61	2
	7/31/2003	19.5	2.0	Well cut down	12.98	3.96	2918.60	3.3	2.51	3011	444	3.22	4
	8/13/2003	19.5	2.0		14.10	4.30	2918.26	3.9	2.56	2535	450	2.94	6
	8/27/2003	19.5	2.0		15.19	4.63	2917.93	3.7	2.63	2766	427	2.55	6
	9/9/2003	19.5	2.0	Casing added	15.67	4.78	2917.78	3.9	2.57	2558	404	1.78	6
	10/1/2003	23.8	2.5	2923.87 1	20.41	6.22	2917.65	4.3	2.82	2721	409	3.00	6
				2003 Minimum			2917.65	3.3	2.47	2535	404	1.78	
				2003 Maximum			2918.26	5.6	2.82	3011	450	3.00	
				2003 Mean			2917.91	4.1		2759	422	2.57	
	7/20/2004	24.75		2924.16 2	18.27	5.57	2918.59	3.7	2.26	4269	533	1.11	6
	8/11/2004	24.75			18.90	5.76	2918.40	3.8	2.60	3915	531	1.46	6
	9/28/2004	24.75			20.57	6.27	2917.89	3.8	2.19	3447	490	2.96	6
				2004 Mean	19.25		2918.29	3.8		3877	518	1.84	
	5/23/2005	25.54			25.04	7.63	2916.53						
	6/29/2005	25.42		2924.04	18.41	5.61	2918.43						
	7/12/2005	25.42			18.49	5.64	2918.40	3.5	3.07	4292	503	1.32	6
	8/10/2005	25.42			19.08	5.82	2918.22						
	9/28/2005	25.42			21.05	6.42	2917.62	4.3	1.83	3179	486	--	6,10
				2005 Mean	20.41		2917.84	3.9		3736	495	1.32	
	2/3/2006				24.74	7.54	2916.62						
	5/15/2006	25.44			24.84	7.57	2916.59						
	6/27/2006				18.15	5.53	2918.51						
	7/12/2006				18.45	5.62	2918.42	3.7	2.36	3586	511	2.92	6
	8/9/2006				18.81	5.73	2918.31						
	10/3/2006				22.70	6.92	2917.12	3.9	2.83	2820	434	1.42	6
				2006 Mean	21.28		2917.59	3.8		3203	473	2.17	
	1/18/2007	25.42			24.21	7.38	2916.78						
	7/19/2007				18.73	5.71	2918.45	3.6	2.60	3382	359	2.76	6
	9/25/2007				21.43	6.53	2917.51	4.1	2.69	2803	274	1.41	6
				2007 Mean	21.46		2917.58	3.8		3093	317	2.09	

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McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
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WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 105	10/8/2001	21.3	2.0	2950.6 1	NM	NM	NM	NM	NM	NM	NM	NM	
	7/8/2002	21.3			14.12	4.30	2946.30	4.0	2.83	1832	404	NM	4
	9/17/2002	21.3			17.51	5.34	2945.26	4.5	3.09	1084	NM	NM	4
	10/7/2002	21.3			18.36	5.60	2945.00	5.0	3.05	1253	NM	NM	4
				2002 Minimum	14.12	4.30	2945.00	4.0	2.83	1084			
				2002 Maximum	18.36	5.60	2946.30	5.0	3.09	1832			
				2002 Mean	16.66	5.08	2945.52	4.5		1390			
	7/17/2003	21.3			14.99	4.57	2946.03	2.9	2.56	1638	380	0.43	2
	7/31/2003	NM	Casing added		NM			NM	NM	NM	NM	NM	No Access
	8/13/2003	28.7		2952.9 1	23.42	7.14	2945.76	2.6	2.67	1183	392	0.86	6
	8/27/2003	28.7			23.12	7.05	2945.85	2.6	2.51	1368	391	0.81	6 **
	9/9/2003	28.7			23.69	7.22	2945.68	3.3	2.55	1254	368	0.45	6
	10/1/2003	28.7			24.83	7.57	2945.33	3.6	2.81	1244	372	0.76	6
				2003 Minimum			2945.33	2.6	2.51	1183	368	0.45	
				2003 Maximum			2945.85	3.6	2.81	1638	392	0.86	
				2003 Mean			2945.66	3.0		1337	381	0.72	
	7/20/2004	29.85	3.1	2953.2 2	23.44	7.14	2946.06	3.0	2.44	1728	421	0.40	6
	8/11/2004	29.85			24.09	7.34	2945.86	3.2	3.07	1530	415	2.84	6
	9/28/2004	29.85			25.30	7.71	2945.49	2.9	2.47	1302	388	0.80	6
				2004 Mean			2945.80	3.0		1520	408	1.35	
	5/23/2005	30.1			26.88	8.19	2945.01						
	6/29/2005				22.30	6.80	2946.40						
	7/12/2005				22.77	6.94	2946.26	3.2	2.68	1444	412	0.54	6
	8/10/2005				24.13	7.35	2945.85						
	9/28/2005				25.90	7.89	2945.31	NM	NM	NM	NM	NM	11
	6/27/2006				22.51	6.86	2946.34						
	7/12/2006	30.1			23.34	7.11	2946.09	2.8	3.01	1484	427	0.43	6
	8/9/2006				24.13	7.35	2945.85						
	10/3/2006				26.70	8.14	2945.06	NM	NM	NM	NM	NM	11
	1/18/2007				29.59	9.02	2944.18						
	7/19/2007				23.80	7.25	2945.95	2.5	2.71	1404	106	0.97	6
	9/25/2007				26.03	7.93	2945.27	NM	NM	NM	NM	NM	11
DCGW- 106	8/19/2002	47.5	2.5	2906.11	Artesian			NM	7.16	792	NM	NM	4
	9/5/2002				Artesian			4.1	5.24	744	NM	NM	4
	9/17/2002				Artesian			4.0	7.21	690	NM	NM	4
	10/7/2002				Artesian			3.0	7.04	843	NM	NM	4
				2002 Minimum				3.0	5.24	690			
				2002 Maximum				4.1	7.21	843			
				2002 Mean				3.7		767			
	7/10/2003				Artesian			4.5	6.12	883	-28	0.26	1
	7/31/2003				Artesian			3.1	7.00	858	-30	0.74	6 *
	8/12/2003				Artesian			3.1	6.96	734	-74	1.03	6 *
	8/27/2003				Artesian			3.0	6.94	1211	-23	0.57	6 *
	9/9/2003				Artesian			3.1	6.86	832	-18	0.45	6 *
	10/1/2003				Artesian			3.0	6.93	871	26	0.25	6 *
				2003 Minimum				3.0	6.12	734	-74	0.25	
				2003 Maximum				4.5	7.00	1211	26	1.03	
				2003 Mean				3.3		898	-24	0.61	
	7/20/2004				Artesian	0.54 gpm		3.1	7.03	909	-73	0.37	6
	7/11/2005				Artesian			3.0	7.05	851	-61	0.20	6
	7/11/2006				Artesian	0.52 gpm		3.1	7.23	867	-55	0.03	6
	7/18/2007				Artesian	0.47 gpm		3.0	7.41	827	-38	0.49	6

TABLE B-2
McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 107	8/23/2002	25.0	1.6	2883.34	10.79	3.29	2880.05	NM	7.25	558	NM	NM	4
	9/5/2002				15.27	4.65	2878.69	4.9	5.39	572	NM	NM	4
	9/18/2002				15.79	4.81	2878.53	4.5	8.02	447	NM	NM	4
	10/7/2002				15.81	4.82	2878.52	4.5	7.72	604	NM	NM	4
				2002 Minimum	10.79	3.29	2878.52	4.5	5.39	447			
				2002 Maximum	15.81	4.82	2880.05	4.9	8.02	604			
				2002 Mean	14.42	4.39	2878.95	4.6		545			
	7/10/2003				15.94	4.86	2878.48	4.5	7.03	686	-123	2.26	1
	7/31/2003				16.83	5.13	2878.21	3.9	7.74	686	-39	1.64	4 *
	8/13/2003				17.34	5.29	2878.05	2.9	6.90	530	-50	0.70	6 *
	8/27/2003				17.62	5.37	2877.97	2.7	7.28	663	-14	0.65	6 *
	9/9/2003				17.78	5.42	2877.92	3.0	7.41	623	-93	0.41	6 *
	10/1/2003				18.29	5.57	2877.77	3.2	7.03	675	38	0.31	6 *
				2003 Minimum	15.94	4.86	2877.77	2.7	6.90	530	-93	0.31	
				2003 Maximum	18.29	5.57	2878.48	4.5	7.74	686	38	0.70	
				2003 Mean	17.30	5.27	2878.07	3.4		644	-30	1.00	
	7/20/2004				16.21	4.94	2878.40	2.9	7.16	640	-125	0.12	6
	7/11/2005				15.91	4.85	2878.49	2.8	6.65	615	-53	0.31	6
	7/11/2006				16.20	4.94	2878.40	2.9	7.94	596	-101	0.06	6
	7/18/2007				16.92	5.16	2878.18	2.9	7.88	574	-44	0.46	6
DCGW- 108	8/23/2002	11.1	2.2	2873.36	10.55	3.22	2870.14	6.5	5.59	204	NM	NM	4
	9/5/2002				7.68	2.34	2871.02	7.0	4.80	1663	NM	NM	4
	9/18/2002				9.90	3.02	2870.34	9.0	4.33	248	NM	NM	4
	10/7/2002				6.56	2.00	2871.36	6.5	5.47	235	NM	NM	4
				2002 Minimum	6.56	2.00	2870.14	6.5	4.33	204			
				2002 Maximum	10.55	3.22	2871.36	9.0	5.59	1663			
				2002 Mean	8.67	2.64	2870.72	7.3		588			
	7/9/2003				6.49	1.98	2871.38	4.0	4.41	250	209	8.88	1
	7/31/2003				8.10	2.47	2870.89	4.3	4.46	250	239	9.28	4 **
	8/13/2003				9.60	2.93	2870.43	4.2	4.41	207	472	7.82	5
	8/27/2003				Dry								
				2003 Minimum	6.49	1.98	2870.43	4.0	4.41	207	209	7.82	
				2003 Maximum	9.60	2.93	2871.38	4.3	4.46	250	472	9.28	
				2003 Mean	8.06	2.46	2870.90	4.2		236	307	8.66	
	7/20/2004				8.75	2.67	2870.69	3.0	4.79	245	261	8.57	6
	7/11/2005				6.60	2.01	2871.35	2.8	3.99	216	488	9.09	6
	7/11/2006				8.32	2.54	2870.82	3.3	4.87	163	312	8.40	6
	7/18/2007				10.00	3.05	2870.31	4.6	4.82	58	82	10.31	6
DCGW- 109	8/23/2002	17.4	2.4	2870.67	7.72	2.35	2868.32	NM	7.02	669	NM	NM	4
	9/5/2002				6.90	2.10	2868.57	8.1	5.22	643	NM	NM	4
	9/18/2002				6.76	2.06	2868.61	5.0	7.44	497	NM	NM	4
	10/7/2002				7.16	2.18	2868.49	5.0	7.33	698	NM	NM	4
				2002 Minimum	6.76	2.06	2868.32	5.0	5.22	497			
				2002 Maximum	7.72	2.35	2868.61	8.1	7.44	698			
				2002 Mean	7.14	2.17	2868.50	6.0		627			
	7/10/2003				7.03	2.14	2868.53	3.3	6.96	724	61	2.91	1
	7/31/2003				7.36	2.24	2868.43	3.8	7.13	676	93	3.23	4
	8/13/2003				7.47	2.28	2868.39	3.3	6.95	581	62	1.81	6
	8/27/2003				7.51	2.29	2868.38	3.8	6.86	705	185	2.10	6 *
	9/9/2003				7.56	2.30	2868.37	4.7	7.22	669	77	1.72	6 *
	10/1/2003				7.28	2.22	2868.45	4.9	6.76	715	213	1.74	6 *
				2003 Minimum	7.03	2.14	2868.37	3.3	6.76	581	62	1.72	
				2003 Maximum	7.56	2.30	2868.53	4.9	7.22	724	213	2.10	
				2003 Mean	7.37	2.25	2868.42	4.0		678	134	1.84	
	7/20/2004				7.31	2.23	2868.44	2.4	6.16	738	119	0.51	6
	7/11/2005				6.91	2.11	2868.56	2.2	7.00	694	136	2.03	6
	7/11/2006				7.29	2.22	2868.45	2.6	8.01	698	54	1.71	6
	7/18/2007				7.46	2.27	2868.40	2.9	6.90	682	-11	0.86	6

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WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 110	8/23/2002	11.1	1.2	2873.39	6.26	1.91	2871.48	5.5	6.30	953	NM	NM	4
	9/5/2002				6.24	1.90	2871.49	7.0	5.50	963	NM	NM	4
	9/18/2002				6.23	1.90	2871.49	5.5	6.99	707	NM	NM	4
	10/7/2002				6.07	1.85	2871.54	6.0	7.01	1030	NM	NM	4
				2002 Minimum	6.07	1.85	2871.48	5.5	5.50	707			
				2002 Maximum	6.26	1.91	2871.54	7.0	7.01	1030			
				2002 Mean	6.20	1.89	2871.50	6.0		913			
	7/9/2003				6.17	1.88	2871.51	NM	5.97	910	116	1.17	1
	7/31/2003				6.32	1.93	2871.46	3.8	6.64	1056	96	3.67	4
	8/13/2003				6.31	1.92	2871.47	4.6	6.32	834	174	2.04	6
	8/27/2003				6.33	1.93	2871.46	5.0	6.51	1041	279	3.37	6
	9/9/2003				6.30	1.92	2871.47	5.8	6.62	1013	233	1.72	6
	10/1/2003				6.34	1.93	2871.46	6.1	6.46	1077	392	1.57	6 *
				2003 Minimum	6.17	1.88	2871.46	3.8	5.97	834	174	1.57	
				2003 Maximum	6.34	1.93	2871.51	6.1	6.64	1077	392	3.37	
				2003 Mean	6.30	1.92	2871.47	5.0		989	269	2.18	
	7/20/2004				6.11	1.86	2871.53	3.0	6.75	1122	85	1.45	6
	7/11/2005				6.11	1.86	2871.53	2.6	5.79	251	234	8.43	6
	7/11/2006				6.10	1.86	2871.53	2.8	7.07	973	170	1.24	6
	7/18/2007				6.23	1.90	2871.49	4.4	6.65	817	-44	1.97	6
DCGW- 111 S	8/12/2003	24.8	1.8	2911.40	4.27	1.30	2910.10	2.8	5.99	1466	131	4.07	6
	8/27/2003				4.55	1.39	2910.01	2.9	5.54	1681	158	3.49	6 **
	9/9/2003				4.75	1.45	2909.95	3.5	4.65	1525	185	1.68	6
	10/1/2003				6.06	1.85	2909.55	3.2	5.96	1764	184	1.71	6
				2003 Minimum	4.27	1.30	2909.55	2.8	4.65	1466	131	1.68	
				2003 Maximum	6.06	1.85	2910.10	3.5	5.99	1764	185	4.07	
				2003 Mean	4.91	1.50	2909.90	3.1		1609	165	2.74	
	7/19/2004				4.94	1.51	2909.89	3.4	5.30	1869	126	1.20	6
	8/11/2004				5.08	1.55	2909.85	3.1	5.10	1673	138	3.81	6
	9/28/2004				4.77	1.45	2909.95	3.4	4.83	1556	173	3.58	6
				2004 Mean	4.93	1.50	2909.90	3.3		1699	146	2.86	
	7/12/2005				5.65	1.72	2909.68	3.2	5.31	1332	194	3.48	6
	9/28/2005				5.25	1.60	2909.80	3.5	4.42	1406	165	3.70	6
				2005 Mean	5.45	1.66	2909.74	3.3		1369	179	3.59	
	7/12/2006				4.91	1.50	2909.90	3.3	5.26	1325	189	3.15	6
	10/3/2006				6.29	1.92	2909.48	3.8	4.84	1344	225	0.45	6
				2006 Mean	5.60	1.71	2909.69	3.5		1335	207	1.80	
	7/19/2007				5.02	1.53	2909.87	3.2	5.22	1259	26	5.44	6
	9/25/2007				5.32	1.62	2909.78	4.2	4.55	1268	67	0.69	6
				2007 Mean	5.17	1.58	2909.82	3.7		1264	46	3.07	
DCGW- 111 D	8/12/2003	41.5	1.8	2911.30	10.93	3.33	2907.97	3.2	5.52	1160	122	1.03	6 **
	8/27/2003				10.92	3.33	2907.97	3.0	5.16	1283	178	1.05	6
	9/9/2003				11.51	3.51	2907.79	3.1	4.85	1266	159	0.71	6
	10/1/2003				11.42	3.48	2907.82	3.0	5.42	1250	171	1.07	6 *
				2003 Minimum	10.92	3.33	2907.79	3.0	4.85	1160	122	0.71	
				2003 Maximum	11.51	3.51	2907.97	3.2	5.52	1283	178	1.07	
				2003 Mean	11.20	3.41	2907.89	3.1		1240	157	0.97	
	7/19/2004				11.73	3.58	2907.72	3.5	5.95	1066	72	0.60	6
	8/11/2004				11.58	3.53	2907.77	3.4	5.50	1202	109	0.04	6
	9/28/2004				11.18	3.41	2907.89	3.2	4.56	1401	187	0.76	6 *
				2004 Mean	11.50	3.50	2907.80	3.4		1223	123	0.47	
	7/12/2005				11.70	3.57	2907.73	3.3	5.25	1269	133	0.17	6
	9/28/2005				11.51	3.51	2907.79	3.2	4.33	1363	147	3.78	6
				2005 Mean	11.61	3.54	2907.76	3.2		1316	140	1.98	
	7/12/2006				11.59	3.53	2907.77	3.3	5.00	1370	152	0.07	6
	10/3/2006				12.24	3.73	2907.57	3.3	6.49	813	86	0.17	6
				2006 Mean	11.92	3.63	2907.67	3.3		1092	119	0.12	
	7/19/2007				11.37	3.47	2907.83	3.2	5.40	1320	27	1.28	6
	9/25/2007				11.61	3.54	2907.76	3.3	6.11	990	42	0.27	6
				2007 Mean	11.49	3.50	2907.80	3.3		1155	35	0.78	

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WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 112	7/31/2003	36.6	2.0	2861.64 4	7.45	2.27	2859.37	3.4	6.65	1331	34	2.96	6
	8/12/2003				7.65	2.33	2859.31	3.2	6.48	1529	-41	0.73	6
	8/27/2003				7.87	2.40	2859.24	2.9	6.66	1813	-157	0.99	6
	9/9/2003				8.05	2.45	2859.19	3.0	6.58	1826	-124	0.50	6
	10/1/2003				7.96	2.43	2859.21	2.9	6.50	1696	72	0.12	6
				2003 Minimum	7.45	2.27	2859.19	2.9	6.48	1331	-157	0.12	
				2003 Maximum	8.05	2.45	2859.37	3.4	6.66	1826	72	2.96	
				2003 Mean	7.80	2.38	2859.26	3.1		1639	-43	1.06	
	7/11/2006				7.28	2.22	2859.42	3.0	8.23	1247	-19	0.88	6
	7/18/2007				7.72	2.35	2859.29	3.1	6.98	1355	-41	0.67	6
DCGW- 131	8/23/2002	22.3	2.8	2923.69	20.69	6.31	2917.38	4.0	6.36	1694	NM	NM	4
	9/5/2002				6.58	2.01	2921.68	4.9	5.44	1685	NM	NM	4
	9/17/2002				6.36	1.94	2921.75	4.0	6.79	1651	NM	NM	4
	10/7/2002				4.81	1.47	2922.22	4.5	6.67	2020	NM	NM	4
				2002 Minimum	4.81	1.47	2917.38	4.0	5.44	1651			
				2002 Maximum	20.69	6.31	2922.22	4.9	6.79	2020			
				2002 Mean	9.61	2.93	2920.76	4.4		1763			
	7/9/2003				0.07	0.02	2923.66	6.0	6.11	2200	-39	0.35	1
	7/31/2003				1.09	0.33	2923.35	2.8	6.56	2038	5	1.31	6
	8/12/2003				2.40	0.73	2922.95	3.7	6.53	1667	-11	3.29	6
	8/27/2003				3.83	1.17	2922.52	2.9	6.49	1946	37	3.17	6
	9/9/2003				4.38	1.34	2922.35	3.3	6.31	1880	74	2.06	6
	10/1/2003				4.85	1.48	2922.21	3.9	6.41	2088	77	1.38	6 *
				2003 Minimum	0.07	0.02	2922.21	2.8	6.11	1667	-11	1.31	
				2003 Maximum	4.85	1.48	2923.66	6.0	6.56	2200	77	3.29	
				2003 Mean	2.77	0.84	2922.84	3.8		1970	36	2.24	
	7/20/2004				0.00	0.00	2923.69	2.7	6.32	1820	13	0.70	6
	7/11/2005				0.00	0.00	2923.69	3.2	6.91	1504	-39	0.91	6
	7/11/2006				Artesian			2.5	6.93	1620	-30	0.05	6 *
	7/18/2007				0.15	0.05	2923.64	2.8	6.54	1569	-42	1.71	6
	9/25/2007				3.27	1.00	2910.30	4.3	6.47	1612	13	0.82	6
				2007 Mean	1.71	0.52	2916.97	3.6		1591	-15	1.27	
DCGW- 132	8/23/2002	10.3	1.2	2861.64	5.74	1.75	2859.89	6.0	4.22	1174	NM	NM	4
	9/5/2002				5.63	1.72	2859.92	7.0	3.54	1233	NM	NM	4
	9/18/2002				5.54	1.69	2859.95	4.7	3.80	965	NM	NM	4
	10/7/2002				5.55	1.69	2859.94	4.5	4.02	1250	NM	NM	4
				2002 Minimum	5.54	1.69	2859.89	4.5	3.54	965			
				2002 Maximum	5.74	1.75	2859.95	7.0	4.22	1250			
				2002 Mean	5.62	1.71	2859.92	5.6		1156			
	7/10/2003				5.06	1.54	2860.09	3.6	3.73	1422	233	0.77	1
	7/31/2003				5.49	1.67	2859.96	3.0	3.67	1368	264	4.07	6
	8/12/2003				5.66	1.73	2859.91	3.9	3.68	1155	251	1.63	6
	8/27/2003				6.01	1.83	2859.80	4.5	3.49	1347	304	1.40	6
	9/9/2003				6.21	1.89	2859.74	5.9	3.24	1199	334	1.15	6
	10/1/2003				6.19	1.89	2859.75	5.3	3.26	1286	374	2.64	6
				2003 Minimum	5.06	1.54	2859.74	3.0	3.24	1155	251	1.15	
				2003 Maximum	6.21	1.89	2860.09	5.9	3.73	1422	374	4.07	
				2003 Mean	5.77	1.76	2859.88	4.3		1296	305	2.18	
	7/20/2004				5.66	1.73	2859.91	3.4	3.62	1390	298	1.70	6
	8/11/2004				6.01	1.83	2859.80	4.3	3.49	1403	310	0.19	6
	9/28/2004				5.66	1.73	2859.91	4.1	3.27	1377	315	1.65	6
				2004 Mean	5.78	1.76	2859.87	3.9		1390	308	1.18	
	7/11/2005				5.28	1.61	2860.03	2.1	3.86	1304	285	0.54	6
	9/27/2005				5.92	1.80	2859.83	4.5	3.42	1332	302	0.21	6
				2005 Mean	5.60	1.71	2859.93	3.3		1318	294	0.38	
	7/11/2006				5.57	1.70	2859.94	2.4	4.18	1351	293	0.02	6
	10/3/2006				6.05	1.84	2859.79	5.1	3.58	1323	307	0.60	6
				2006 Mean	5.81	1.77	2859.86	3.7		1337	300	0.31	
	7/18/2007				5.81	1.77	2859.86	2.8	3.99	1271	44	0.67	6
	9/26/2007				5.88	1.79	2859.84	5.3	3.73	1279	182	0.90	6
				2007 Mean	5.85	1.78	2859.85	4.1		1275	113	0.79	

TABLE B-2
McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 133	8/23/2002	9.7	1.5	2874.45	3.71	1.13	2873.32	8.5	3.75	1110	NM	NM	4
	9/5/2002				3.96	1.21	2873.24	8.1	2.80	1289	NM	NM	4
	9/18/2002				3.23	0.98	2873.46	6.5	2.98	901	NM	NM	4
	10/7/2002				3.83	1.17	2873.28	4.5	3.14	1177	NM	NM	4
				2002 Minimum	3.23	0.98	2873.24	4.5	2.80	901			
				2002 Maximum	3.96	1.21	2873.46	8.5	3.75	1289			
				2002 Mean	3.68	1.12	2873.33	6.9		1119			
	7/10/2003				3.36	1.02	2873.42	5.0	3.07	1168	415	5.80	1
	7/31/2003				3.46	1.05	2873.39	8.8	2.91	1181	498	4.81	6 *
	8/13/2003				3.96	1.21	2873.24	7.3	2.94	1043	465	3.76	6
	8/27/2003				4.23	1.29	2873.16	6.7	2.77	1310	469	2.20	6
	9/9/2003				4.38	1.34	2873.11	7.5	2.64	1280	456	2.71	6
	10/1/2003				4.34	1.32	2873.13	5.6	2.78	1325	491	5.66	6 **
				2003 Minimum	3.36	1.02	2873.11	5.0	2.64	1043	456	2.20	
				2003 Maximum	4.38	1.34	2873.42	8.8	3.07	1325	498	5.66	
				2003 Mean	3.96	1.21	2873.24	6.8		1218	476	3.83	
	7/20/2004				3.78	1.15	2873.30	4.6	2.83	1219	447	5.30	6
	8/11/2004				4.18	1.27	2873.17	7.3	2.85	1359	444	3.30	6
	9/28/2004				3.87	1.18	2873.27	4.3	2.56	1211	486	5.45	6
				2004 Mean	3.94	1.20	2873.25	5.4		1263	459	4.68	
	7/11/2005				3.20	0.98	2873.47	3.7	3.02	953	490	6.66	6
	9/27/2005				5.96	1.82	2872.63	5.1	2.72	1103	511	6.75	6
				2005 Mean	4.58	1.40	2873.05	4.4		1028	501	6.71	
	7/11/2006				3.92	1.19	2873.25	4.9	3.08	1061	465	4.42	6
	10/3/2006				4.43	1.35	2873.10	5.2	2.84	1161	447	6.33	6
				2006 Mean	4.18	1.27	2873.18	5.1		1111	456	5.38	
	7/18/2007				4.18	1.27	2873.17	7.3	3.04	1026	188	4.96	6
	9/26/2007				3.80	1.16	2873.29	7.3	2.97	1081	202	6.62	6
				2007 Mean	3.99	1.22	2873.23	7.3		1054	195	5.79	
DCGW- 134	8/23/2002	9.3	1.7	2854.19	4.18	1.27	2852.92	8.2	6.62	258	NM	NM	4
	9/5/2002				4.01	1.22	2852.97	7.0	5.28	386	NM	NM	4
	9/18/2002				3.85	1.17	2853.02	6.0	6.83	289	NM	NM	4
	10/7/2002				3.86	1.18	2853.02	6.0	7.03	395	NM	NM	4
				2002 Minimum	3.85	1.17	2852.92	6.0	5.28	258			
				2002 Maximum	4.18	1.27	2853.02	8.2	7.03	395			
				2002 Mean	3.98	1.21	2852.98	6.8		332			
	7/16/2003				3.55	1.08	2853.11	4.0	6.34	411	184	5.45	1
	7/31/2003				3.92	1.19	2853.00	3.8	6.69	470	140	6.69	4
	8/11/2003				4.08	1.24	2852.95	4.5	6.44	410	235	5.73	6 *
	8/27/2003				4.21	1.28	2852.91	4.9	6.53	563	269	5.30	6
	9/9/2003				4.24	1.29	2852.90	5.3	6.87	535	147	5.77	6
	10/1/2003				4.19	1.28	2852.91	5.4	6.49	589	336	5.80	6 *
				2003 Minimum	3.55	1.08	2852.90	3.8	6.34	410	147	5.30	
				2003 Maximum	4.24	1.29	2853.11	5.4	6.87	589	336	5.80	
				2003 Mean	4.03	1.23	2852.96	4.7		496	247	5.65	
	7/20/2004				3.75	1.14	2853.05	2.6	6.81	474	146	6.46	6
	7/11/2005				2.60	0.79	2853.40	1.9	6.36	455	168	7.11	6
	7/11/2006				3.60	1.10	2853.09	3.1	7.16	398	62	7.61	6
	10/3/2006				5.36	1.63	2852.56	5.4	6.15	536	286	4.70	6
				2006 Mean	4.48	1.37	2852.83	4.2		467	174	6.16	
	7/18/2007				3.99	1.22	2852.98	4.5	6.93	405	-43	4.82	6
	9/25/2007				3.93	1.20	2852.99	5.8	6.47	468	50	7.07	6
				2007 Mean	3.96	1.21	2852.98	5.2		437	4	5.95	

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New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 135	8/23/2002	7.4	1.3	2855.14	Dry								
	9/5/2002				6.35	1.94	2853.21	8.5	5.30	682	NM	NM	4
	9/18/2002				5.20	1.58	2853.56	6.8	6.19	189	NM	NM	4
	10/7/2002				6.04	1.84	2853.30	6.0	6.01	249	NM	NM	4
				2002 Minimum	5.20	1.58	2853.21	6.0	5.30	189			
				2002 Maximum	6.35	1.94	2853.56	8.5	6.19	682			
				2002 Mean	5.86	1.79	2853.35	7.1		373			
	7/10/2003				5.79	1.76	2853.38	6.5	5.76	120	190	5.49	1
	7/31/2003				6.10	1.86	2853.28	5.9	5.66	151	135	5.35	5
	8/11/2003				6.80	2.07	2853.07	NM	NM	NM	NM	NM	8
	8/27/2003				Dry								
				2003 Minimum	5.79	1.76	2853.07	5.9	5.66	120	135	5.35	
				2003 Maximum	6.80	2.07	2853.38	6.5	5.76	151	190	5.49	
				2003 Mean	6.23	1.90	2853.24	6.2		136	163	5.42	
	7/20/2004				6.80	2.07	2853.07	4.3	5.47	106	173	8.00	6
	7/11/2005				3.40	1.04	2854.11	4.3	4.83	108	114	7.76	6
	7/11/2006				6.10	1.86	2853.28	5.3	4.87	101	41	6.4	6
	10/3/2006				5.95	1.81	2853.33	5.6	4.69	110	457	8.46	6
				2006 Mean	6.03	1.84	2853.31	5.4		106	249	7.43	
	7/18/2007				6.60	2.01	2853.13	5.9	4.06	251	45	6.95	6
	9/25/2007				1.81	0.55	2854.59	6.3	4.64	91	127	5.95	6
				2007 Mean	4.21	1.28	2853.86	6.1		171	86	6.45	
DCGW- 136	8/23/2002	11.0	2.3	2852.88	4.03	1.23	2851.65	6.8	6.96	360	NM	NM	4
	9/5/2002				4.39	1.34	2851.54	6.0	5.01	422	NM	NM	4
	9/18/2002				3.79	1.16	2851.72	6.0	5.38	296	NM	NM	4
	10/7/2002				3.72	1.13	2851.75	6.0	5.60	409	NM	NM	4
				2002 Minimum	3.72	1.13	2851.54	6.0	5.01	296			
				2002 Maximum	4.39	1.34	2851.75	6.8	6.96	422			
				2002 Mean	3.98	1.21	2851.67	6.2		372			
	7/10/2003				2.89	0.88	2852.00	4.0	4.76	438	236	5.88	1
	7/31/2003				4.09	1.25	2851.63	4.7	5.28	423	263	7.16	4
	8/11/2003				4.38	1.34	2851.54	4.5	5.13	362	310	5.63	6 **
	8/27/2003				4.87	1.48	2851.39	4.5	5.31	450	336	5.68	6
	9/9/2003				4.79	1.46	2851.42	5.4	5.10	380	294	6.11	6
	10/1/2003				4.73	1.44	2851.44	4.7	5.53	456	392	5.34	6
				2003 Minimum	2.89	0.88	2851.39	4.0	4.76	362	294	5.11	
				2003 Maximum	4.87	1.48	2852.00	5.4	5.53	456	392	5.68	
				2003 Mean	4.29	1.31	2851.57	4.6		418	333	5.44	
	7/20/2004				3.44	1.05	2851.83	2.9	5.71	537	220	4.46	6
	8/11/2004				4.25	1.30	2851.58	4.0	4.92	462	319	4.99	6
	9/28/2004				2.68	0.82	2852.06	4.0	6.05	702	198	1.25	6
				2004 Mean	3.46	1.05	2851.83	3.6		567	246	3.57	
	7/11/2005				2.50	0.76	2852.12	2.3	5.28	492	246	5.48	6
	9/27/2005				3.98	1.21	2851.67	4.3	5.04	474	368	3.93	6
				2005 Mean	3.24	0.99	2851.89	3.3		483	307	4.71	
	7/11/2006				3.36	1.02	2851.85	3.1	5.73	536	271	3.93	6
	10/3/2006				4.24	1.29	2851.59	4.3	6.24	546	335	2.14	6
				2006 Mean	3.80	1.16	2851.72	3.7		541	303	3.04	
	7/18/2007				4.74	1.44	2851.43	4.0	5.00	346	46	7.63	6
	9/25/2007				4.09	1.25	2851.63	4.9	5.48	499	59	3.76	6
				2007 Mean	4.42	1.35	2851.53	4.4		423	52	5.70	

TABLE B-2
McLAREN PIT MONITORING WELL FIELD PARAMETER DATA - 2002 THROUGH 2007
New World Mining District Response and Restoration Project

WELL	DATE	TOTAL DEPTH (feet)	APPROX CASING STICK-UP (feet)	MEASURING POINT ELEVATION (meters)	DEPTH TO GROUND WATER (feet)	DEPTH TO GROUND WATER (meters)	GROUND WATER ELEVATION (meters)	TEMP (deg. C)	pH (su)	SPECIFIC CONDUC-TANCE (uS)	OXIDATION REDUCTION POTENTIAL (mV)	DISSOLVED OXYGEN (mg/L)	NOTE AND MONITORING METHOD
DCGW- 137	8/23/2002	15.5	1.7	2848.67	6.46	1.97	2846.70	6.0	5.83	225	NM	NM	4
	9/5/2002				4.47	1.36	2847.31	6.0	5.96	265	NM	NM	4
	9/18/2002				3.39	1.03	2847.64	6.0	7.38	182	NM	NM	4
	10/7/2002				3.34	1.02	2847.65	6.0	7.52	246	NM	NM	4
				2002 Minimum	3.34	1.02	2846.70	6.0	5.83	182			
				2002 Maximum	6.46	1.97	2847.65	6.0	7.52	265			
				2002 Mean	4.42	1.35	2847.32	6.0		230			
	7/10/2003				3.25	0.99	2847.68	4.0	6.70	235	155	0.46	1
	7/31/2003				4.12	1.26	2847.41	2.8	6.77	231	132	2.77	6
	8/11/2003				4.44	1.35	2847.32	3.2	6.71	196	210	3.23	6 **
	8/27/2003				4.83	1.47	2847.20	3.6	6.81	248	239	4.21	6
	9/9/2003				4.72	1.44	2847.23	4.2	6.90	243	202	3.05	6
	10/1/2003				4.82	1.47	2847.20	4.7	6.78	258	373	3.15	6
				2003 Minimum	3.25	0.99	2847.20	2.8	6.70	196	132	2.77	
				2003 Maximum	4.83	1.47	2847.68	4.7	6.90	258	373	4.21	
				2003 Mean	4.36	1.33	2847.34	3.7		235	231	3.28	
	7/20/2004				3.26	0.99	2847.68	3.0	7.48	232	22	4.73	6
	8/11/2004				4.10	1.25	2847.42	3.4	6.73	245	187	2.36	6
	9/28/2004				2.64	0.80	2847.87	4.3	6.58	236	148	2.95	6
				2004 Mean	3.33	1.02	2847.65	3.6		238	119	3.35	
	7/11/2005				2.62	0.80	2847.87	2.5	7.28	216	127	5.29	6
	9/27/2005				13.09	3.99	2844.68	4.6	5.80	232	287	0.82	6
				2005 Mean	7.86	2.39	2846.28	3.6		224	207	3.06	
	7/11/2006				3.30	1.01	2847.66	2.7	7.22	185	148	4.48	6
	10/3/2006				3.72	1.13	2847.54	4.7	6.84	240	252	1.83	6
				2006 Mean	3.51	1.07	2847.60	3.7		213	200	3.16	
	7/18/2007				4.35	1.33	2847.34	3.5	6.80	87	26	4.59	6
	9/25/2007				2.96	0.90	2847.77	5.0	5.86	230	38	2.40	6
				2007 Mean	3.66	1.11	2847.56	4.2		159	32	3.50	
DCGW- 138	8/23/2002	21.0	2.9	2861.67	8.73	2.66	2859.01	5.0	6.74	296	NM	NM	4
	9/5/2002				10.22	3.12	2858.55	6.8	4.92	333	NM	NM	4
	9/18/2002				10.80	3.29	2858.37	4.0	6.58	283	NM	NM	4
	10/7/2002				11.63	3.54	2858.12	4.0	6.73	459	NM	NM	4
				2002 Minimum	8.73	2.66	2858.12	4.0	4.92	283			
				2002 Maximum	11.63	3.54	2859.01	6.8	6.74	459			
				2002 Mean	10.35	3.15	2858.51	5.0		343			
	7/10/2003				4.58	1.40	2860.27	3.5	6.15	237	148	9.78	1
	7/31/2003				7.60	2.32	2859.35	3.1	5.84	163	202	10.52	4
	8/11/2003				8.95	2.73	2858.94	2.4	5.64	207	354	9.44	6
	8/27/2003				10.20	3.11	2858.56	2.4	6.00	348	291	8.75	6
	9/9/2003				10.94	3.33	2858.33	2.8	6.29	409	158	7.30	6 **
	10/1/2003				12.26	3.74	2857.93	3.1	6.04	579	403	7.52	6 *
				2003 Minimum	4.58	1.40	2857.93	2.4	5.64	163	158	7.30	
				2003 Maximum	12.26	3.74	2860.27	3.5	6.29	579	403	9.44	
				2003 Mean	9.09	2.77	2858.90	2.9		324	301	8.25	
	Not Monitored in 2004												
	Not Monitored in 2005												
	7/11/2006				5.60	1.71	2859.96	1.9	7.77	306	285	6.94	6
	7/18/2007				7.78	2.37	2859.29	2.3	5.47	*** 85 - 129	78	10.13	6

Notes:

NM	Not measured	Total Depth (TD) and depth to groundwater measured from top of PVC casing
ND	Not determined	Casing stick-up measured from ground surface
SC	Specific Conductivity measured in micro siemens/cm	2003 data selected for min, max, mean
ORP	Oxidation Reduction Potential (Eh) measured in millivolts	* ORP measurement slowly decreasing
DO	Dissolved Oxygen measured in milligrams per liter	** ORP measurement slowly increasing
***	Unstable measurement	
gpm	Gallons per minute	

Note on Monitoring Method

1. Temperature and DO measurement conducted as pre-purge, downhole measurement, other parameters measured after purging well
2. DO measurement conducted as an in-situ, downhole measurement, remainder of parameters measured after purging well
3. Sample collected for measurement of field parameters. No significant purging of well conducted
4. Sample collected for measurement of field parameters after purging of well conducted
5. All field parameters measured with multiprobe in in-situ, downhole measurement. No purging of well conducted
6. All field parameters measured with multiprobe in in-situ, downhole measurement after purging of well conducted
7. Depth to groundwater exceeded multiprobe chord length and no sample was collected
8. Insufficient water for multiprobe in well
9. All field parameters measured with multiprobe in *flow-through-cell* after purging of well conducted
10. Suspect incorrect DO measurement due to aeration of groundwater from purging well
11. Bent casing prevents access to groundwater in well

Note on Measuring Point Elevation

1. Elevation based on measured total depth of well.
2. Ground surface elevation adjacent to well surveyed by Gallatin National Forest personnel on August 24, 2004
3. Ground surface elevation estimated from topographic survey

APPENDIX B-2

2007 Groundwater Field Forms

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APPENDIX C

FIELD NOTES
2007 SURFACE WATER AND GROUNDWATER MONITORING
New World Mining District Response and Restoration Project

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APPENDIX D

LABORATORY ANALYTICAL REPORTS
2007 SURFACE WATER AND GROUNDWATER MONITORING

New World Mining District Response and Restoration Project

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